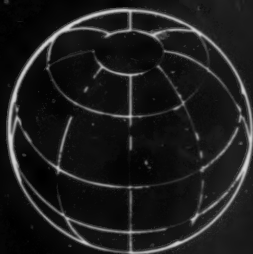


SEPTEMBER 1955

MINING WORLD



PHILIPPINE MINING
TODAY AND TOMORROW



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New Mining Code . . . p. 73
New Government Mine Mines . . . p. 70
U.S. in Philippine Iron Mines . . . p. 76
Also—
ASCI Underlines U.S. Metallurgy . . . p. 53

For pumping abrasives



This pat hand

depicts the range of A-S-H pumps available to mining operators throughout the world. This exclusive offering includes 61 different sizes and types of pumps for handling materials from microns to 6" lumps, with capacities from 10 G.P.M. to 12,000 G.P.M. Whatever your need in processing or in tailings disposal, this selection offers you greater pumping efficiency and definite savings in maintenance and power.

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HYDROSEAL and CENTRISEAL
SAND, SLURRY & DREDGE PUMPS

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CATERPILLAR ANNOUNCES

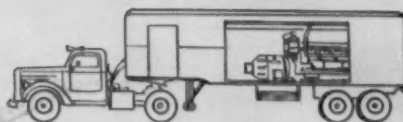
A NEW LINE OF PORTABLE ELECTRIC SETS

Dependable electric power—where it's needed, when it's needed



USE CAT PORTABLE ELECTRIC SETS

- When you're on a remote location with no high line power available.
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available in 9 models, 30 to 315 KW



These Caterpillar Portable Electric Sets are ready to serve you in emergency or full-time operation. They are available in all the usual voltages, 50 or 60 cycle.

Each is a complete unit, with cooling system, fuel tank and switch-gear, mounted on skids, semi-trailer or full trailer, ready to be moved anywhere you need it at a moment's notice. Even the biggest trailer-mounted set is well within highway weight and size restrictions.

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Please send me further information on Cat Portable Electric Sets.

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dippers and parts
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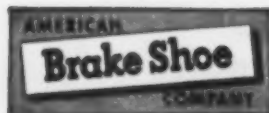
CRUSHING

concaves
 mantles
 jaw plates
 mill liners
 hammers

HANDLING

bulldozer blades
 tractor rollers, idlers
 sprockets, grouser bars
 truck beds
 grizzle parts
 ore car wheels and liners
 sheaves, gears, pinions

Amsco also produces other alloy steels with maximum wear resistance under particular conditions of service.



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 Chicago Heights, Ill.

Mining World

Including the Export Edition WORLD MINING

Published monthly except in April when publication is semi-monthly

VOLUME 17

SEPTEMBER 1955

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General Manager, San Francisco
M. F. Holsinger
Editor George O. Argall, Jr.
Field Editor Stanley Dayton
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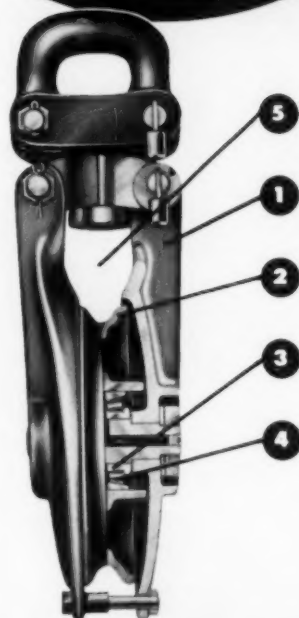
WORLD MINING is published the 26th of each month as a regular department of MINING WORLD and is also circulated as a separate publication on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.



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Cummins new NRT-6 Turbodiesel delivers 300 horsepower. One of three new Turbodiesels by Cummins. The others are 250 h.p. (model NT-6) and 600 h.p. (model VT-12).

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Turbocharging—which harnesses exhaust gases normally wasted—produces this extra horsepower by achieving a more perfect air-fuel mixture in the combustion chamber. There is no parasitic load as in supercharged engines. This means drastically reduced fuel costs . . . fewer internal stresses . . . longer engine life.

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MW-9

Mr. Earl Craig, Mill Supt., Minerals Engineering Company, Montana Tungsten Division, Glen, Montana, is shown here with the Denver "Sub-A" Flotation Machine (open-flow type) that added about \$300 per day new profits by lowering WO₃ in tailings.

"I have been using Denver 'Sub-A' Flotation Machines since 1931 in various milling operations in a number of states," said Mr. Craig, "and am partial to them because of their continuous trouble-free operation and good metallurgical results."

Denver "Sub-A" Flotation Machine PAYS FOR ITSELF IN LESS THAN 60 DAYS

Here's How Minerals Engineering Company's Tungsten Flotation Paid Off!

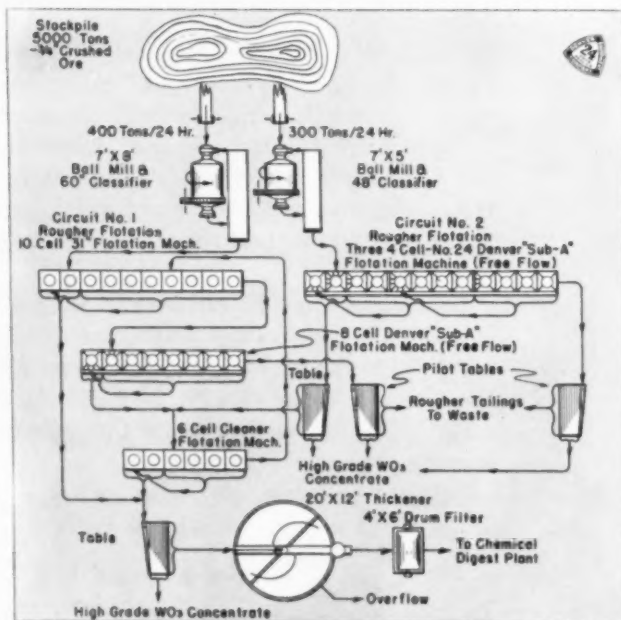
This 8-cell No. 24 (43x43) Denver "Sub-A" Flotation Machine (free-flow type) paid for itself and installation in less than 2 months. In June, 1954 this machine was installed at the Glen, Montana, tungsten (scheelite) operation of Minerals Engineering Co. as a scavenger to reduce flotation tailings loss. Here are the results.* Three new 4-cell Denver "Sub-A" Flotation Machines (free-flow type) have recently been installed and tonnage has been increased to 900 tons/24 hrs.

Tonnage per 24 hrs.	Tailings without Denver "Sub-A"	Tailings with 8-cell Denver "Sub-A"	Tailings with additional three 4-cell Denver "Sub-A"
333	0.0577% WO ₃	_____	_____
350-400	_____	0.0446% WO ₃	_____
900	_____	_____	0.0446% WO ₃ **

Assays shown are average for approximate 5 month operating period.

*Tonnage increase and greater recovery by addition of the 8-cell Denver "Sub-A" Flotation Machine (free-flow type) amounted to about \$300 daily in new profits.—Minerals Engineering Company.

**Most recent tailings assays are down to .036WO₃.



See first-hand—in your own mill—what a new Denver "Sub-A" Flotation Machine (free-flow type) will do for you. May we please send you details of our special trial offer?

"The firm that makes its friends happier, healthier and wealthier"

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DENVER EQUIPMENT CO.

1400 17TH ST., DENVER 17, COLO.





One of approximately 1200 on the Minnesota Iron Ranges, this 34-ton "Euc" is loaded by a 5 cu. yd. shovel at a large open pit operation. Rear-Dump models are available with semi-rigid or spring mounted axles, Allison Torqmatic drives and transmissions, or conventional 5 and 10 speed transmissions.

More Profit with "Eucs" in Mines and Quarries

■ Built for tough off-the-highway service, Rear-Dump and Bottom-Dump "Eucs" and Euclid Scrapers are cutting the cost of moving ore and overburden, sand and gravel, and stone on quarry and mining operations. Big payload capacity, fast travel speed and high job availability add up to more loads per hour and lower cost per ton or yard hauled.

■ Your Euclid Distributor will provide a hauling production and cost estimate for your operation... there's no obligation so get in touch with him soon. Have him show you how Euclid equipment can improve your profit picture.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio



This Bottom-Dump "Euc" is being loaded with 17 cu. yds. of sand and gravel from an overhead hopper for haul to the washing plant. Owner is Interstate Sand and Gravel of Covington, Ohio.



Ideal Cement Co. of Portland, Colorado uses 22-ton Rear-Dumps with quarry bodies to haul stone from the face to the crusher. Top speed of this Model 36 TD, with full payload, is 32.5 m.p.h. Spring mounted drive axle and Allison Torqmatic drive and transmission are important factors in stepping up production and profits at this quarry operation.



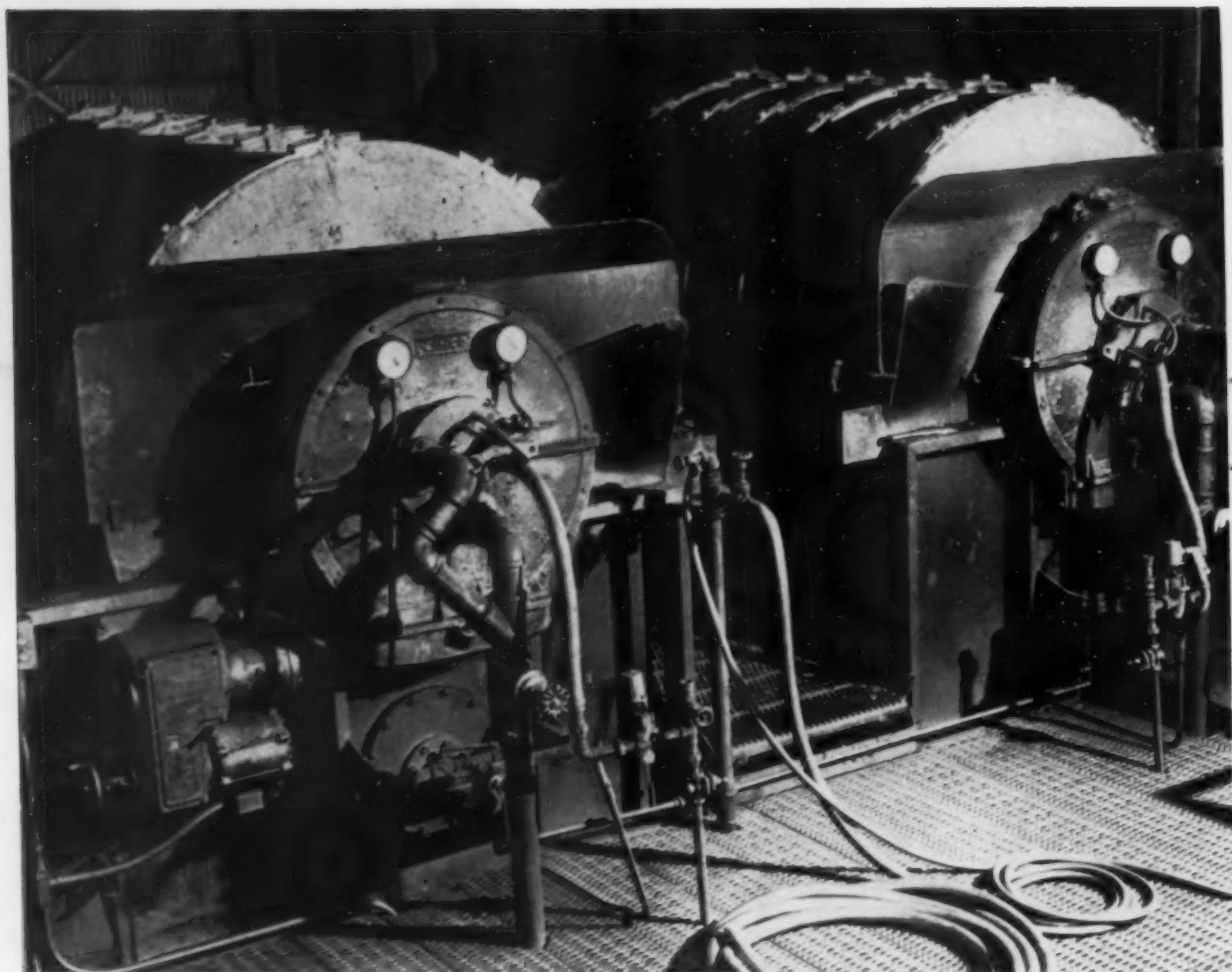
Euclid Twin-Power Scraper stripping overburden at a large gypsum quarry in Iowa. Powered by two 190 or 200 h.p. engines with torque converters and semi-automatic transmissions, this "Euc" self loads, has a struck capacity of 18 cu. yds. and travels up to 30 m.p.h. with full payload.



Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE





REDUCE COSTS AND

Eimco equipment helps to reduce costs and increase production at Climax Molybdenum Company property at Climax, Colorado.

This is one of the world's great mines, more than two miles above sea level and with the record for high tonnage production on a per man shift basis.

One of the pieces of equipment used to obtain high tonnage production is the Eimco Folding Scraper. This scraper was developed at Climax by Climax people and its use permits loading ore into cars at a rate of 16 tons per minute from one slusher drift.

In the development headings, dependable Eimco air-powered 12B, 21 and 40H RockerShovels load out the broken material to keep development on schedule.

Along the main haulage ways, especially at loading stations, cleanup is maintained by a trolley type electric powered Eimco 40HE RockerShovel. This loader has a power swing to clean the full width of the drift and the trolley permits it to transport itself quickly around the mine.

In the mill, Utaloy liners are among the brands

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INCREASE PRODUCTION

employed as mill linings. Uталoy liners are molybdenum — chrome alloy steel, carefully heat treated. Marquenching in molten salt assures uniform hardness throughout liner sections up to 8 inches in thickness.

Eimco Agidisc filters are at work dewatering the concentrate in the mill. This recent installation handles 350,000 lbs. of concentrate per 24 hour day. The Eimco filters operate automatically and require only periodical inspection. They require less than 50% of the floor space used for the equipment they

replaced, have reduced the moisture content in the cake by 33%, and increased the filter rate by more than 15%.

Eimco equipment will help to increase production and reduce costs in your mine and mill. Specialized equipment to meet your requirements in loading or filtration has been developed to meet the needs of industry. Call an Eimco engineer to help you specify the equipment best suited for your job. There is no obligation.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A.

• Export Offices: Eimco Bldg., 52 South St., New York City



FOR OPEN PIT

DART MODEL 30-SL

MODEL 30-SL—30 ton end dump. Full cab. 184" wheelbase. 300 to 350 HP Diesel Engine with or without torque converter. 100,000 lb. Dart planetary rear axle with 20" x 9" air brakes—25,000 lb. front axle with 20 1/4" x 5" air brakes. 16:00 x 25, 24-ply front tires—18:00 x 25, 32-ply rear tires. Hydraulic steering—20 Cu. Yd. Rock Body. Approximate Weight, 46,000#.



OR UNDERGROUND

DART MODEL 18-S-UG-S

MODEL 18-S-UG-S—18 ton underground truck powered by 275 H. P. Diesel Engine with torque converter and fully reversible transmission. Hydraulic motor operates steel apron conveyor. Equipped with exhaust scrubber. Hydraulic steering. Operates as shuttle car. Height, 66"; width, 10' 8"; length, 28'. Approximate weight, 39,000#.



Dart cuts costs!



DART 20S



DART 10S

**DART ENGINEERS
CAN HELP SOLVE YOUR
HAULAGE PROBLEM.**

Your inquiries are invited

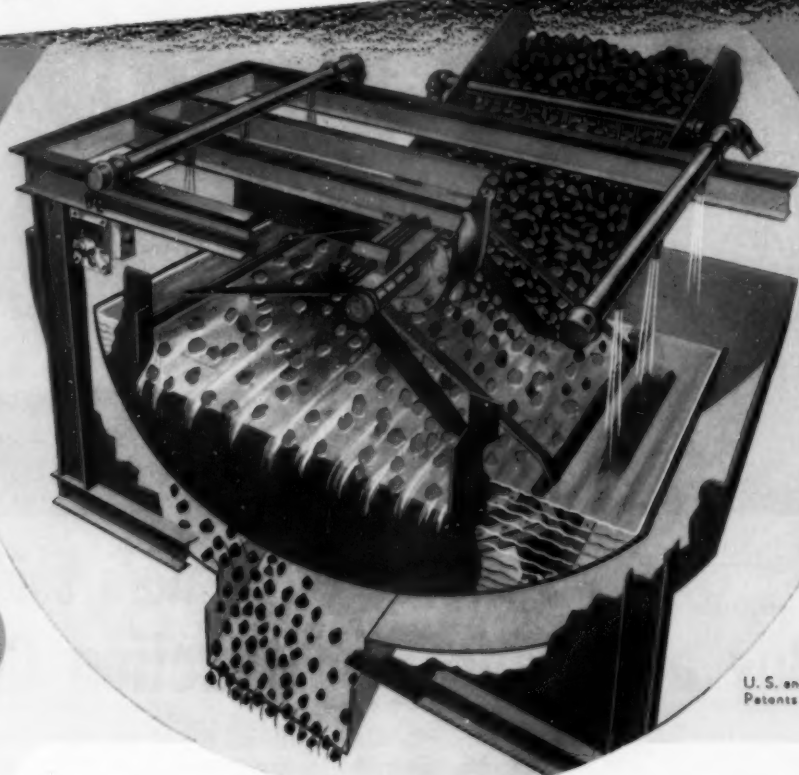
DART TRUCKS
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SUBSIDIARY OF THE CARLISLE CORPORATION

For the majority of its 51 years of engineering and building specialized heavy duty trucks, The DART TRUCK COMPANY has served the Mining Industry.

Dart engineering has produced many "firsts" in design which today are standard. The DART line includes models for mining ranging from 10 ton capacity through 75 ton capacity . . . the most complete line of off-highway trucks . . . all are built to provide maximum haulage with minimum maintenance, even under the most rigorous conditions.

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THE NEW 'OCC' VESSEL
A Notable Development in HMS



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- Low operating, maintenance costs.
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- Quickly adjustable rake speed.

Complete HMS testing, plant designing and installation services.

The ORE & CHEMICAL CORP.

Division: Mining &
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80 BROAD ST., NEW YORK 4, N.Y.



Here's why 836 Operators said: "Buy a Traylor TY Reduction Crusher"

There must be a mighty good reason why so many operators the world over would decide to buy the same machine . . . a Traylor TY Reduction Crusher.

There is. It's a matter of costs. Not first costs that occur once . . . but operating costs that go on year after year.

Low-cost operation is the big reason 836 operators decided on a Traylor TY.

A Traylor TY is a heavy duty machine built

with an eye to the future. It boasts of many, many features such as bronze lined eccentric . . . spring mounted suspension . . . short head. The result is less down-time, increased production and reduced power requirements with a Traylor TY.

The full story behind the decision of hundreds of profit-wise ore producers to buy a Traylor TY is told in Traylor Bulletin 7112. Write for your copy today.

TRAYLOR ENGINEERING & MFG. CO.

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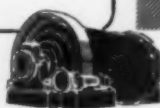
Primary Gyratory Crushers



Rotary Kilns



Secondary Gyratory Crushers



Ball Mills



Jaw Crushers



Apron Feeders



Tournapull's power-transfer differential, which automatically prevents wheel slippage, keeps rig moving through soggy footing where other units often bog down.

Speed your Mine exploration with a versatile D Tournapull

The HIGH-SPEED, self-loading D Tournapull has the versatility needed to speed all the exploratory phases of your mine development. This job-proved unit moves in or around any location at speeds up to 28 mph. It cuts grades accurately, hauls anywhere, and spreads in controlled layers. Its big tires effectively compact material. Where land restoration is required, the "D" is ideal for segregating topsoil, refilling and landscaping. Where ore-bearing soils are to be tested, the 138 hp "D" will self-load over 5 bank yards per trip for quick delivery to screens or hopper. Where dams or reservoirs are needed for water supply — ditches or sluice-

ways for drainage — the "D" moves in, gets the job done fast, and moves on to the next task without delay.

Big low-pressure tires, positive power steer and a unique power-transfer differential enable Tournapulls to travel slippery saddleback roads or through deep mud and sand which would stall an ordinary truck. Electric scraper and steer controls and a foam-rubber seat give easy operation and easy riding in tough going. These are but a few of the reasons why this fast utility tool speeds search and pilot tasks, cuts costs, and eliminates many inconveniences of exploratory operation. It will pay you to learn more about what it can do for you.

Tournapull—Trademark Reg. U.S. Pat. Off. DP-58-M-b

The self-loading "D" handles all these jobs:

- Clears, levels sites for camps and drill setups. Eliminates cost of expensive cribbing.
- Strips surface material to expose bedrock. Gives you better access to formation.
- Builds, maintains and gravels access roads. Fills roads across soft, low areas.
- Loads, hauls material from open pits in 9-ton (7-yard) scraper.
- Hauls in supplies. Carries loads over terrain no other wheeled vehicle can cross.
- Levels building sites. Digs sludge basins, drainage ditches and sluiceways.
- Moves into any site under its own power — over pavement or cross-country.
- Supplies electricity for emergency lighting or temporary equipment operation.
- Plows snow from supply roads. Self-loads, hauls snow, ice from camp sites.
- Dozer blade available. One man can do clearing, build roads, drain, grade and strip.



LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company



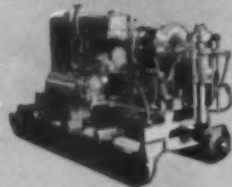
When you're CORE-DRILLING, it's no gamble

with these 3 aces in the hole



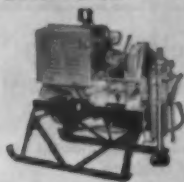
22-HD The rugged, heavy-duty model. Capacity—2000' with EX fittings. Also available as truck-mounted drill or on twin-column mount for underground operation. Bulletin D-28.

1



12-B Extremely portable, weighs approximately 1200 lbs. Capacity—1000' with EX fittings. Also available on twin-column mount with air motor drive for underground operation. Bulletin D-21.

2



No. 7 The lightweight, easily transportable model. Can be taken underground or transported by airplane, boat, or even muleback into remote areas. Capacity—500' with EX fittings. Bulletin D-24.

3



CONTRACT CORE DRILLING Sub-surface test borings for mineral prospecting, foundation drilling, and grout hole drilling are available on a contract basis. Highly skilled crews and complete stock of core drills, bits, and accessory equipment are maintained at all times.

JOY Diamond Core Drills When these three "aces" go into the holes, luck no longer is a factor. They are a sure bet to tell you exactly what is down there. And, at Joy, you can find the right "ace" to do the best job for you.

With maximum capacities ranging from 500 to 2000 feet, there are Joy diamond drills applicable to almost any coring job. And they'll do the best job for you. Here's why . . .

EXTREME PORTABILITY Skid mountings, compact design, and rugged construction make it possible to drag Joy diamond drills into some of the most inaccessible locations.

VERSATILITY Because they are available with either hydraulic or screw-feed swivelheads and with a choice of gasoline, electric or air power, Joy core drills can fit into any drilling program without expensive preparations.

Check your drilling needs against this group of outstanding drills. One of them will be suitable to your needs and it will do an accurate, economical job of proving the mineral value of your property. Write today for literature on the machine you need to **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: **Joy Manufacturing Company (Canada) Limited, Galt, Ontario.**



Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF
CORE DRILLS AND MOTORIZED DRILL RIGS
SINCE 1851

Tournatractor quickly cleans mine floor. Operator makes effective use of rig's instant-shift, constant-mesh transmission to doze and back away in a hurry. Big tires provide plenty of flotation and traction, have good durability despite the abrasive, rocky footing. Unit works 24 hours a day, 7 days a week, helps on both stripping and ore removal.

Iron mine in New York



puts 19 mph speed on cleanup work

- Rubber-tired tractor clears mine-floor after blasting
- Rig also cleans up around 4½-yd. shovel
- In winter, plows snow from haul roads and blast areas

With drilling and blasting done throughout the day along an ore body two miles in length, this New York open-pit iron mine has a major cleanup problem. They have licked the problem with the speed and maneuverability of a rubber-tired Tournatractor.

On the relatively long runs between operating faces, this 19 mph rig makes a much faster trip than could a crawler-tractor. Another advantage of Tournatractor is that it does not cut-up the surface of the haul roads like a crawler does.

During winter, Tournatractor also finds time to plow snow from the pit roads and loading areas. It also clears areas to be blasted.

This keeps snow from getting mixed in with the shot rock and later from causing trouble inside the crushers.

"Excellent on night shift"

For work on the night shift, owners are particularly pleased with the lights on their Tournatractor. They find that "night work does not slow this rig nor put any limitations on areas where it can travel or work."

For proof of these advantages, ask for a demonstration in your pit of this high-speed 208 hp machine. See for yourself how quickly and how economically it will handle your scattered pushing, pulling and dozing jobs.

The ore body being mined here was discovered in 1810 by engineers surveying a military road between Albany and Ogdensburg. Only a small amount of iron was removed, however, until 1944 when modern methods of beneficiating magnetite and low-grade non-magnetic martite ores made the operation profitable. This year, 1,300,000 gross tons will be processed. All will be taken from a deposit slightly over 2 miles long and 200' to 1400' wide. Iron content averages 24%. Overburden includes a structural hanging wall of granitized gneiss, plus up to 60' of glacial drift (mostly sand, hardpan, and boulders). Height of operating faces is set at 50' except for some first cuts of 100'. Drilling is made with 42-T and 50-T churn drills, with chrome-nickel-moly bits of 4340 grade. Nine-inch primary holes are spaced about 23' apart and burden at toe is kept as close to 20' as possible. Every pound of explosive breaks about 2.35 gross tons of crude ore. This is loaded by 4½-yd. shovels into 22-ton rear-dumps and transported to the 54 inch primary crusher. Rock chunks too big to pass the 4½-yd. dipper (about 1 chunk per 40 tons of crude ore) are reduced to handling size by a 4-ton drop ball handled by a truck crane.

Tournatractor—Trademark T-751-M-b



LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

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Wherever ores and minerals are processed in quantity, Nordberg Mining Machinery is now in use or being installed. Efficiency-minded operators depend on Nordberg Machinery to assure maximum and continuous production at low operating and maintenance cost. Designed and built for the Mining Industry, this outstanding machinery has become a "Standard of the World."

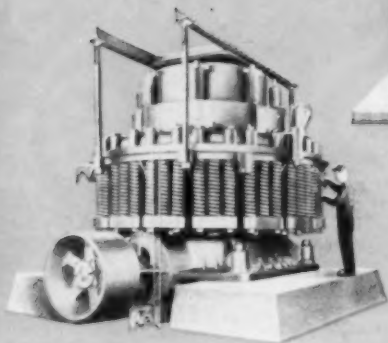
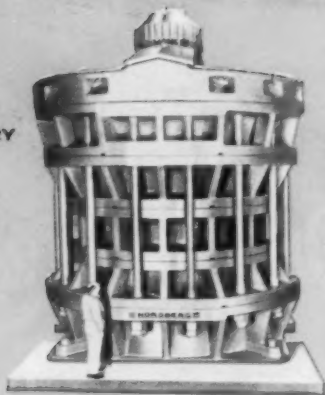
Nordberg Machinery includes *Symons** Primary Gyratory Crushers for primary breaking; *Symons* Standard and Short Head Crushers for fine reduction crushing; *Symons* Vibrating Bar Grizzlies and Screens for scalping and sizing; Grinding Mills for wet or dry grinding; Mine Hoists; and a broad line of Diesel and Gas engines in sizes from 10 to over 12,000 H.P.

Write for literature on the machinery you need.

NORDBERG MFG. CO.,
Milwaukee, Wisconsin

***SYMONS**... A Registered Nordberg
Trademark known throughout the world

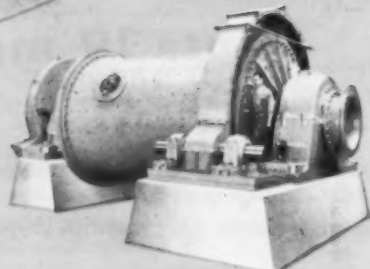
**SYMONS*
PRIMARY GYRATORY
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**SYMONS*
CONE CRUSHERS**



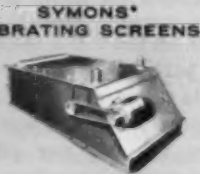
**SYMONS*
VIBRATING GRIZZLIES**



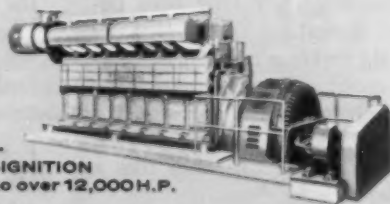
**NORDBERG BALL-
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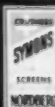
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DUALFUEL* and SPARK-IGNITION
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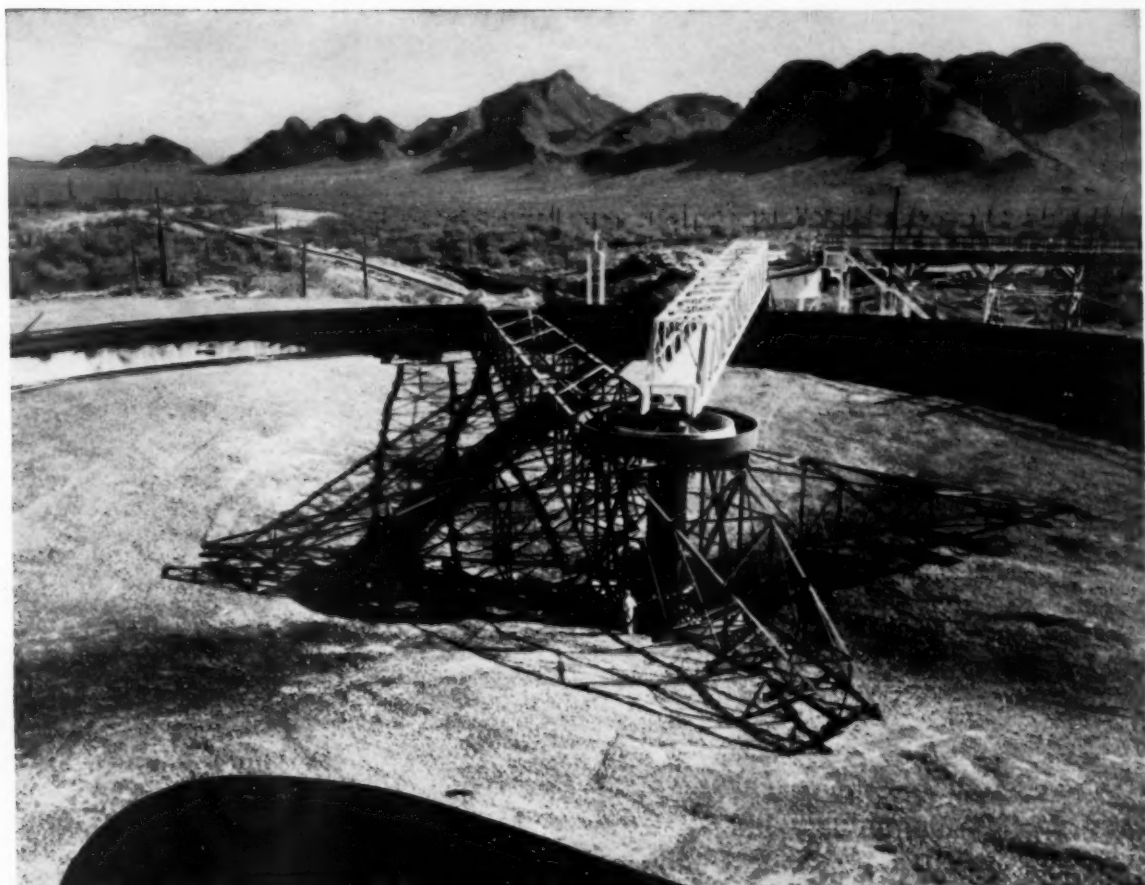
M355



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MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS
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Tailings Handling Made Easy

Closeup of 275 ft. dia. Dorr Thickener during final stages of construction. Part of Hydroseparator is visible behind walkway.

7450 TPD of copper tailings can be a big headache without proper disposal facilities. At a new Concentrator in Arizona the proven Dorr Hydroseparator-Thickener team is taking shock loads and variable feed characteristics in stride.

The giant Thickener — 275 ft. in diameter — dominates the picture. But equally important to successful operation is the 30 ft. diameter

Dorr Hydroseparator. By scalping out oversize material ahead of the Thickener, the Hydroseparator boosts thickening capacity and cuts water losses in the underflow.

We'd like to tell you more about Dorr-Oliver's ability to provide the correct solution to tailings handling problems. Just drop a note to Dorr-Oliver Incorporated, Stamford, Conn. or in Canada, 26 St. Clair Ave. East, Toronto 5.



DORR-OLIVER

INCORPORATED

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

STAMFORD • CONNECTICUT • U.S.A.

Largest Copper Producer in the Far East Treats 4000 t.p.d. with 100% Cyanamid Reagent Combination

As the new Toledo Copper Project of Atlas Consolidated Mining and Development Corporation swings into full-scale production, a major step in rebuilding the Philippine Mining Industry will have been taken.

With a capacity of 4000 t.p.d. the new Toledo mill will be by far the largest copper producer in the Far East. At peak production the mill will produce 200 t.p.d. of copper concentrates assaying 24% Cu.

For the preliminary copper float AEROFLOAT® 238 Promoter and AEROFROTH® 80 Frother are used to produce a high-grade concentrate running 26% Cu. A bulk float follows, using a reagent combination composed of AEROFLOAT® 25 Promoter, AERO® Xanthate 301, AERO® Promoter 404 and AEROFROTH® 80 Frother. Bulk concentrates are then reground and refloats to produce a second copper concentrate and the pyrite product. In the selective flotation circuit, reagents include AERO® Brand Cyanide, AEROFLOAT® 238 Promoter, AEROFROTH® 80 Frother and lime.

Combined copper concentrates containing over 92% of the total copper in the feed are presently being shipped to Japan for smelting. Recovery of molybdenite from the copper concentrate is now under study, and work is also underway to expand plant capacity to 6000 t.p.d.

In the development of treatment methods for Toledo ore, Cyanamid Engineers have been privileged to work closely with A. Soriano y Cia., General Managers and Consultants for Atlas Consolidated. We will welcome the opportunity to work with you on your beneficiation problems and to provide your reagent needs from Cyanamid's complete line of metallurgical chemicals.

®Trade Mark



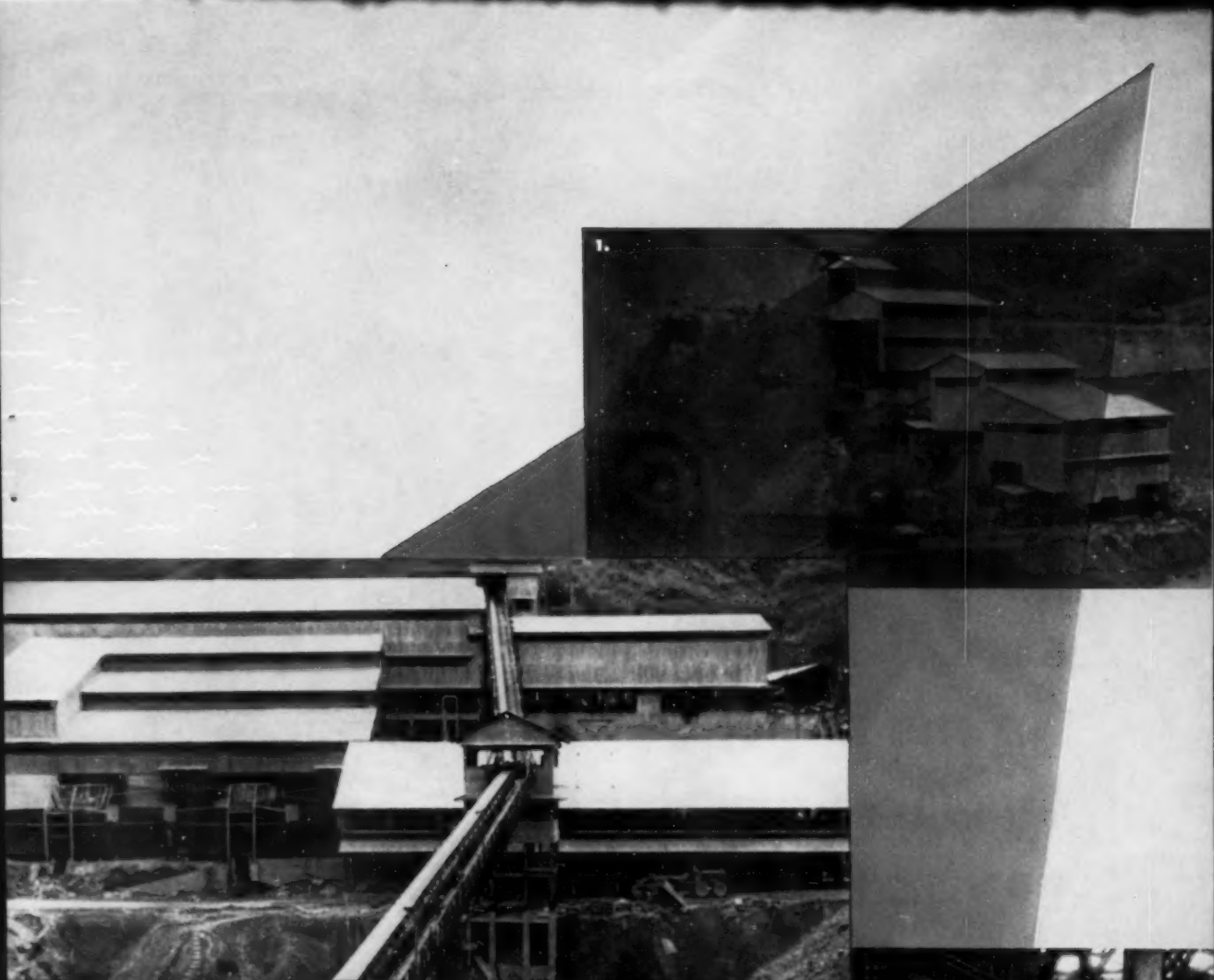


PHOTO 1.

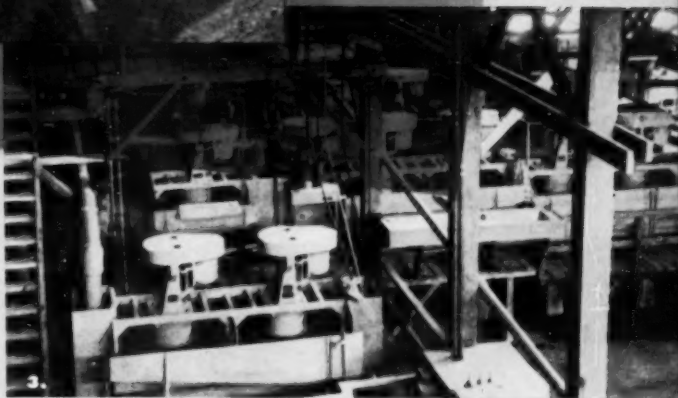
Crushing plant at entrance to open pit mining operation on the north side of the *Bay View, Iloilo*, Toledo on the island of Cebu, P.I. Crushing is in two stages to $\frac{3}{8}$ ". Crushed ore is conveyed across the river to the grinding and flotation plant.

PHOTO 2.

Grinding of Toledo ore is also in two stages. The first stage employs 8' x 6' ball mills in closed circuit with rake classifiers. The second stage includes 20" cyclones, 6' x 10' ball mills and bowl classifiers.

PHOTO 3.

Interior of Toledo mill showing Japanese-built 56" flotation machines in the roughing circuit. Much of the mill equipment was salvaged from pre-war Philippine mills and rebuilt.

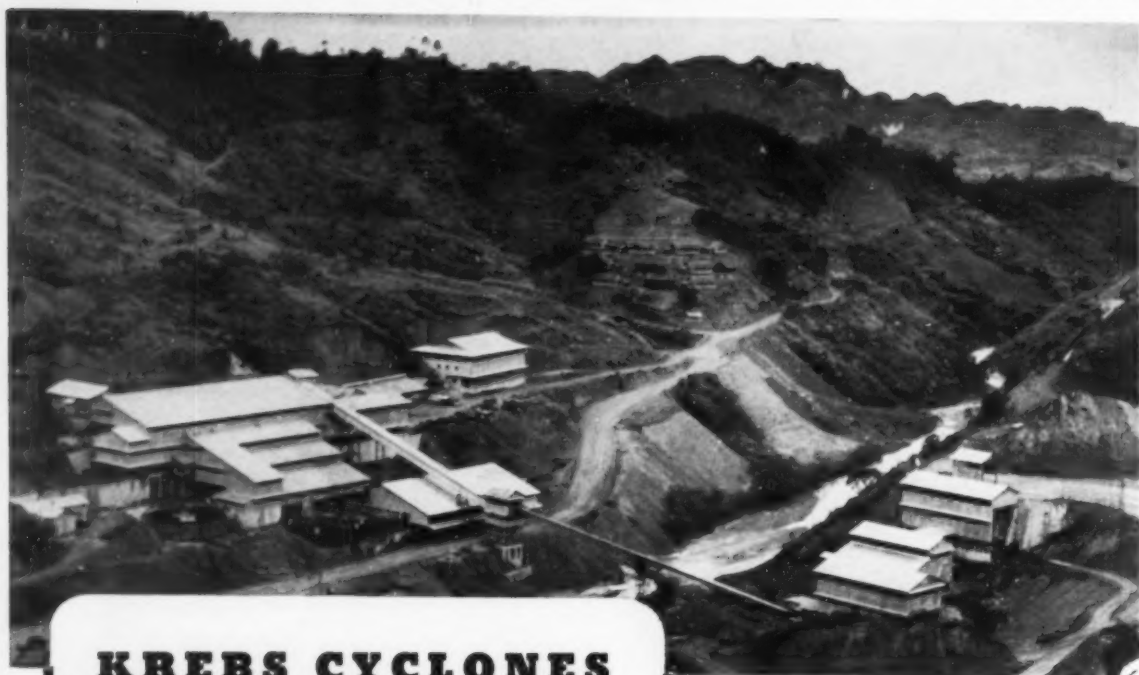


AMERICAN *Cyanamid* COMPANY

MINERAL DRESSING DEPARTMENT



30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK



KREBS CYCLONES
CLASSIFY ALL THE
TONNAGE AT THIS
TOLEDO COPPER
PROJECT

The 4,000 t.p.d. of copper ore milled by this largest Far East copper plant is handled by six Krebs model D20 cyclones. Additional Krebs Cyclones for closed circuit classification of the concentrate regrind and for desliming of a crusher product are to be installed shortly.

The services of our metallurgical staff and pilot plant facilities are available upon request.

Partial view showing some of the Model D20 Krebs Cyclones in main grinding circuit.



One of the 33 Clarkson Feeders in operation at Toledo. This is the dependable reagent feeder used by virtually all copper concentrators the world over. The Clarkson Co. is a division of Equipment Engineers Inc.



EQUIPMENT ENGINEERS INC.

41 SUTTER STREET • SAN FRANCISCO 4, CALIFORNIA

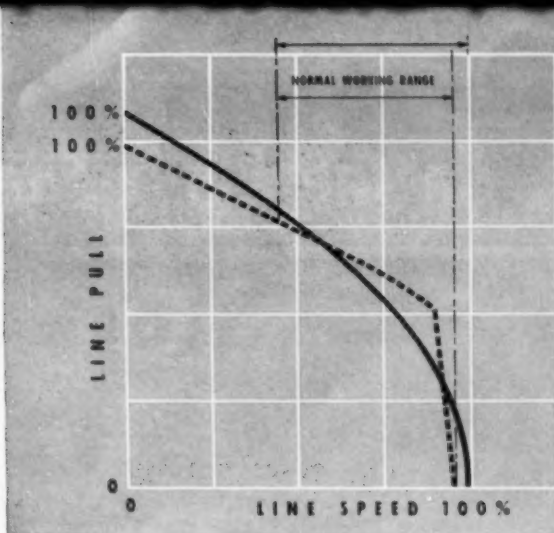
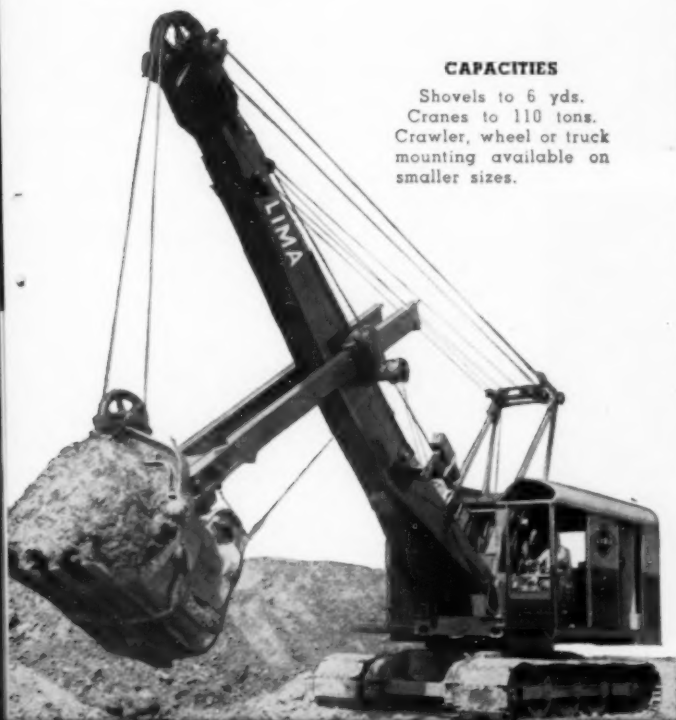
LIMA'S new Electric Power Unit eliminates stalls, won't burn out

LIMA's new optional power unit matches, *electrically*, diesel-torque converter performance. It combines an AC motor with a single stage torque converter to adapt actual power output to work load demand—at constant motor speed. Thus, you get power on demand through a wide operating range . . . and the motor will not stall or burn out in heavy load operation.

Just check the performance curves — They make it clear that LIMA's new electric power unit is the perfect answer when your job calls for electrically powered machines. The new unit is available on every LIMA machine. It will pay you to get the full story today from your nearby LIMA distributor . . . or write: Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

CAPACITIES

Shovels to 6 yds.
Cranes to 110 tons.
Crawler, wheel or truck
mounting available on
smaller sizes.

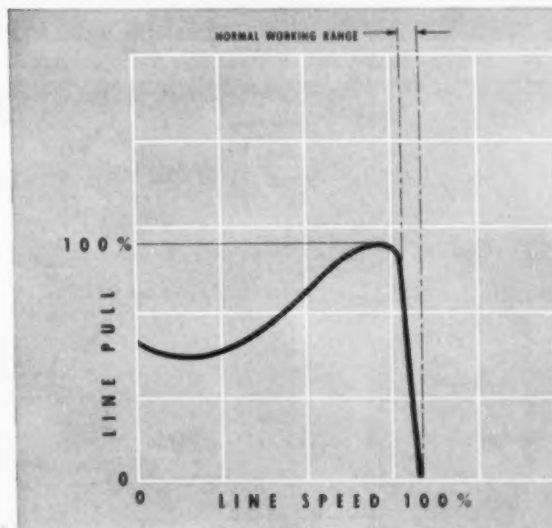


Power Performance of LIMA'S New Optional Unit:

A.C. Electric motor with torque converter drive [Diesel-torque converter curve (dotted line) shown for comparison]

With this drive, even under extreme loading, the motor will pull down in speed only a very small amount. It can never be stalled.

The line pull will constantly increase through a long pull down speed range, depending upon the load applied.



Power Performance: A.C. Electric motor with direct drive

The motor speed and torque varies as shown for line speed and pull. With a pull down in speed of only 3% to 5%, torque rises too fast. The motor will stall quickly after peak torque is reached. Workable speed range is small, stalls are frequent.



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DRAGLINES • PULLSHOVELS

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Construction Equipment Division • LIMA • OHIO • U. S. A.

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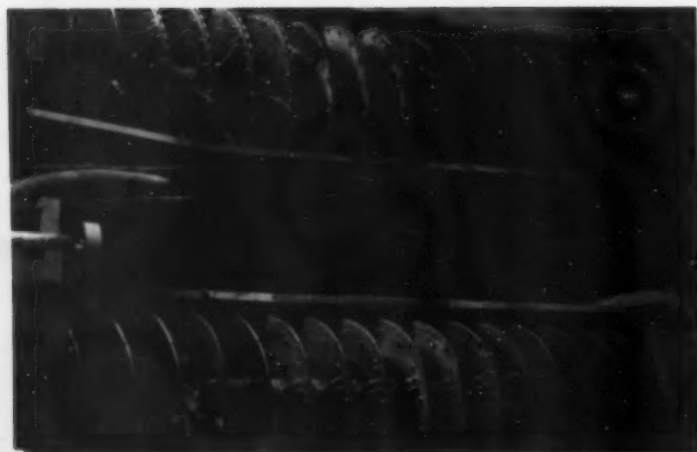
In the Philippines, too, it's the cost



**Marcy Ball Mills and Akins Classifiers
at Lepanto Consolidated Mining Co.**



**Marcy Ball Mills at Atlas Consolidated
Mining and Development Corp.**



Akins Classifiers at Acoje Mining Co.

cutting team... MARCY and AKINS

Grinding mills and classifiers are selected on the basis of low cost per ton output and efficient, dependable mechanical and metallurgical operation. That's why so many successful mining companies throughout the world use Marcy Mills and Akins Classifiers.

IN THE CASE OF THE PHILIPPINES...

12 companies have purchased 37 Marcy Ball and Rod Mills, in sizes from 30" dia. to 8' dia.; 6 companies have purchased 24 Akins Classifiers, in sizes from 24" to 78". These purchases include 8 repeat orders for Marcy Mills and 10 repeat orders for Akins Classifiers... convincing evidence of dependable, cost-cutting mechanical and metallurgical performance.

Worldwide Proof of Low-Cost Performance

In addition to the many Marcy Mills and Akins Classifiers chosen by both large and small U.S. companies, Marcy and/or Akins have recently been the choice of leading companies in the following countries:

CANADA	BOLIVIA	BELGIUM	ENGLAND	NEWFOUNDLAND
CHILE	MEXICO	YUGOSLAVIA	COLOMBIA	BELGIAN CONGO
PHILIPPINES	IRELAND	NEW ZEALAND	PERU	KENYA, E. AFRICA
ITALY	MOROCCO	GREECE	FRANCE	KUWAIT
AUSTRALIA	SO. RHODESIA	SPAIN	AUSTRIA	UNION S. AFRICA

Marcy Mills and/or Akins Classifiers have also been sent to...

JAPAN	BRAZIL	PORTUGAL	KOREA	HONDURAS
ALASKA	EL SALVADOR	SWEDEN	RHODESIA	INDIA
CUBA	VENEZUELA	ARGENTINA	NEW CALEDONIA	
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IMPROVE YOUR FLOTATION with Dow's complete service

DOW XANTHATES—superior collectors for efficient, low-cost recovery of sulfide minerals. For example, with Z®-11 and proper pulp conditioners you can actually *reduce* collector consumption while *increasing* recovery. And you'll get away from those complex collector combinations, too.

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MINING TECHNICAL SERVICE—maintained by Dow to promote flotation economy, this service is always available to help solve your flotation problems. Working in Dow's complete laboratories or traveling to mills around the world, Mining Technical Service has aided mill men throughout the mining industry with their flotation problems.

You, too, can gain the benefits of research and experience through Dow's Mining Technical Service. To request this service or to get samples of dependable Dow reagents, write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. OC 817J-2.

you can depend on **DOW CHEMICALS**



COST-CUTTING MEMOS:



USE THE RIGHT EXPLOSIVES: Don't buy certain grades or types of explosives from force of habit! Possibly you can replace gelatins and semi-gelatins with equivalent-strength, and more economical, ammonium nitrate dynamites. Coal mines operating on short schedules should check economy of improved permissibles. Stripping and open pit operations may find greatest savings in cored ammonium nitrate explosives.



USE THE RIGHT TYPE CARTRIDGE: Fluted ends on cartridges (as with Apex® above) make for easier loading of both horizontal and vertical holes with no significant loss of compaction. Spiral winding protects against cartridge rupture. Loading crews are not held up by stuck cartridges. In underground operations, Redi-Slit® cartridges mean quicker and easier loading. The right type cartridge will cut costs.



SELECT THE PROPER POINT OF INITIATION: There is much misinformation and superstition on this subject. However, many open pit operations are effecting important savings by initiating blasts at the point of maximum confinement—normally the bottom of each hole. Not only is explosive efficiency increased, but excessive air blast is avoided . . . as well as complaints and damage claims.



KEEP UP WITH THE LATEST TECHNIQUES: Blasting is continually being improved. See that your men are using the methods which work best in your particular operation. The men above are looking at "The Inside Story"—an Atlas technical movie—during their lunch hour. If you'd like to show this movie to your men, simply write us on your company letterhead. We'll arrange a showing for you at an early date.

Yes, you can cut costs with better blasting. Better blasting is simply a combination of the right explosives plus the right methods . . . for your job. Talk with your Atlas representative. Let him examine your blasting problems. He may have some ideas which can mean real savings in your particular operation.

And send us the names of the men you'd like to receive "Better Blasting." This free, informative periodical is published quarterly by Atlas to bring you technical tips and product announcements.



ATLAS EXPLOSIVES

"Everything for Blasting"

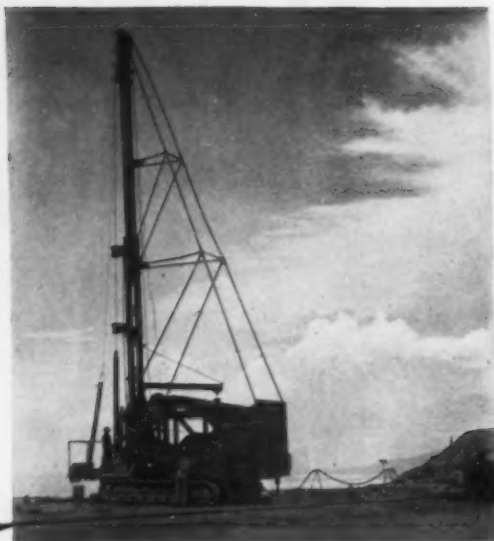
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TIREX is unusually flexible even in below freezing temperatures. It resists acids, oil and flame.

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This Tough, Trouble-Free Belt Takes Heavy Loads In Stride

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A sturdy, multiple-ply, rayon duck carcass makes this belt lighter and thinner than cotton-carcass belts of comparable strength. Skim coats between plies insure perfect bonding.

Like other heavy duty belts,

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We also manufacture a complete line of industrial rubber products: belting, hose, packing and moulded rubber of every construction for every need. *Through your Quaker and Quaker Pioneer distributor our research and engineering services are always available to help you solve any industrial rubber problem. Write for name of nearest distributor.*

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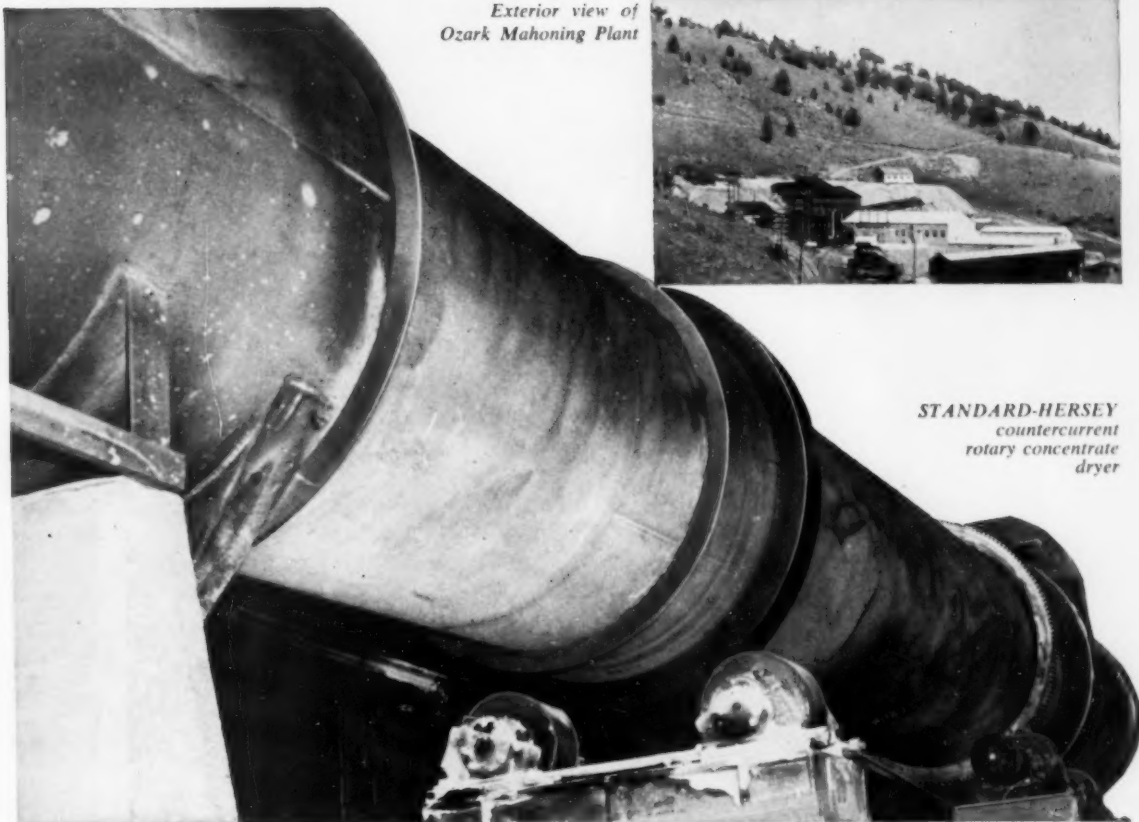


QUAKER PIONEER RUBBER MILLS
San Francisco 7, California

Exterior view of
Ozark Mahoning Plant



STANDARD-HERSEY
countercurrent
rotary concentrate
dryer



FLUORSPAR CONCENTRATE DRIED TO ALMOST 0% MOISTURE BY A

STANDARD HERSEY ROTARY DRYER

The Northgate, Colorado plant of Ozark Mahoning Co. produces Acid Grade Fluorspar exclusively. Since their flotation concentrator went into production in October of 1952, output has increased to the point where their Standard-Hersey dryer is now operating at 150% rated capacity.

The filter cake, produced in Denver equipment, is transported by screw conveyor to a stacking belt for stock piling and

sampling, or directly into the 6' by 50' Standard-Hersey countercurrent rotary dryer. Moisture in the concentrate is reduced by the dryer from 12-14% to approximately 0% for shipment.

The dryer is lined throughout its length with refractories, as is the dryer furnace. Exhaust gasses at 350°F. pass through a cyclone type dry dust collection system with a balanced airlock arrangement. The temperature of the discharge product is 450°F. Semi-automatic burner controls provide efficient operation of the dryer unit.

The unusually large diameter of the dryer was selected to minimize the velocity of the gas stream through the dryer thus reducing concentrate dust loss to an estimated 1-ton of concentrate per 24 hours.

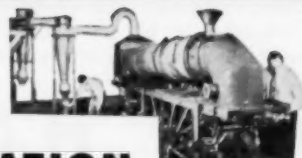
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Soft touch for top tonnage!

P&H

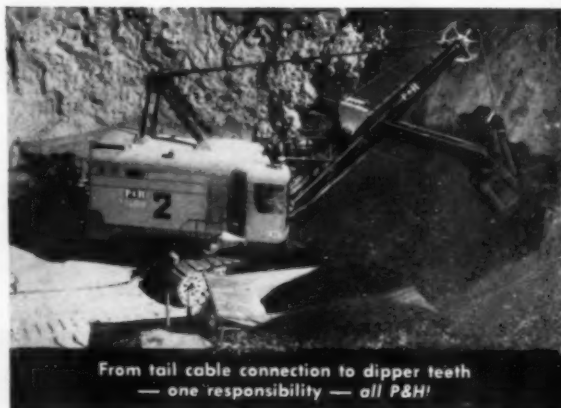
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WHAT! . . . a control system that can make as much as 10% difference in electric shovel production? Yes, it can . . . *and does!* Actual tests reveal these two outstanding reasons:

ONE: *Electronic Control is practically effortless.* As a matter of fact, P&H Electronic Control was so completely effortless that we had to build in a slight one-lb. pressure so the operator could feel it. Result: The fatigue factor is so minimized that production at the end of the shift is comparable with that at the beginning!

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P&H electronic control users say it's the last step in the evolution of fine controls. We will gladly send full information. P&H Electric Shovel Division, Harnischfeger Corporation, Milwaukee 46, Wis.



From tail cable connection to dipper teeth
— one responsibility — all P&H!

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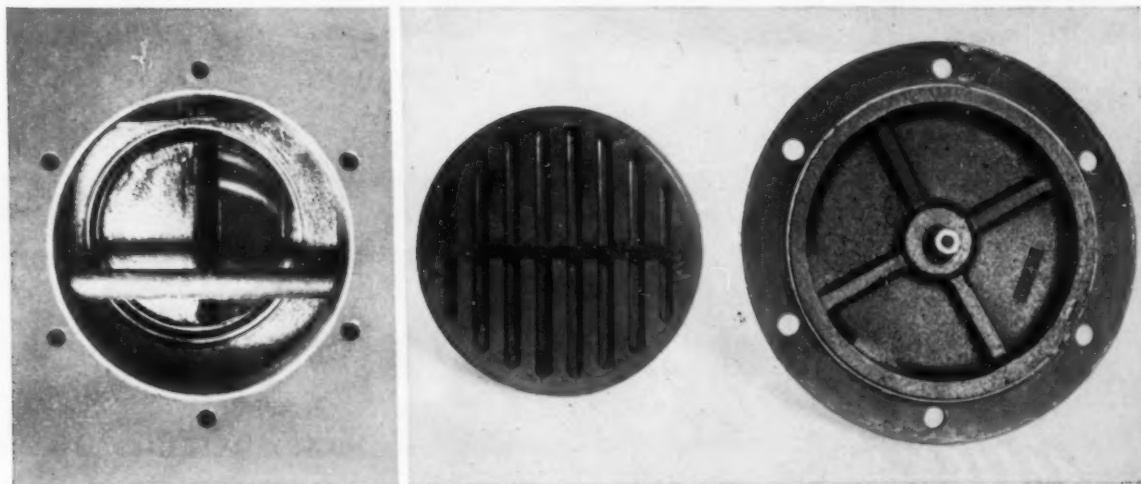
Standard Engineer's Field Report

CASE HISTORY

Calol Multi-Service Oils
LUBRICANT

LOCATION *Arizona*

Compressor valve parts free of deposits after working 40,680 hours in constant dust



NOTE CLEANLINESS of this valve port, channel valve and cover (left to right) when removed for first time from a two-stage air compressor...after 40,680 hours of work! Lubricated with Calol Multi-Service Oil since installation 11 years ago, the unit supplied air—5000 cubic feet per minute—for a giant Arizona copper mine. Compressor was housed in open shed where dust and grit were always present in the air...yet there was practically no wear or formation of deposits. Since moved to another mine site, the compressor still has all its original parts.

Calol Multi-Service Oils keep wear rates low and carbon deposits to a minimum in any type of recip-

rocating compressor. Also recommended for pumps, diesel engines and enclosed gears. These oils are available in several different grades to meet all conditions and requirements.



TRADEMARK "CALOL" REG. U. S. PAT. OFF.

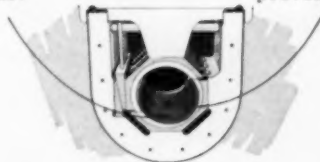
FREE CATALOG: "How to Save Money on Equipment Operation" will be sent on request to Standard Oil Company of California, 225 Bush Street, San Francisco, California.

FOR MORE INFORMATION about this or other petroleum products...or the name of your distributor, write or call any of the companies listed below.

Why CALOL Multi-Service Oils cut deposits & costs

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Detergent keeps contaminants suspended in oil, inhibitor prevents foam.

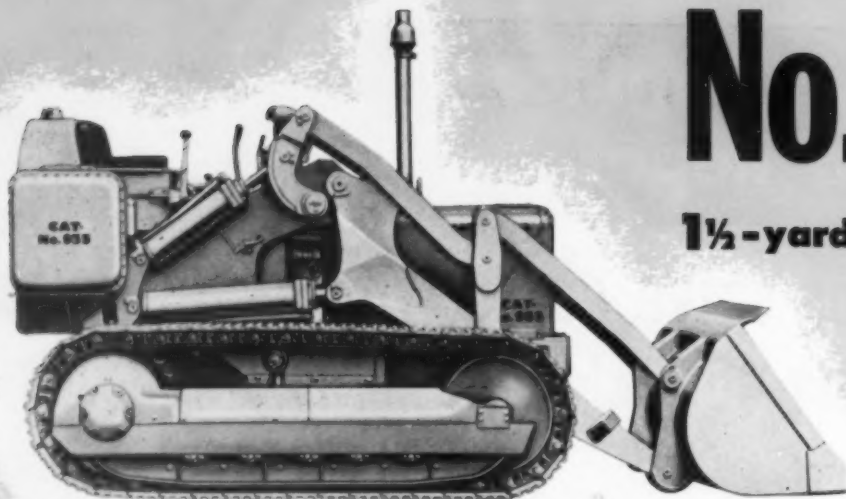


Stay on "hot-spots"...cover surfaces rapidly and uniformly.

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No. 955

1½-yard capacity

*Caterpillar
announces*

2 NEW



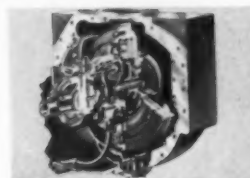
No. 933

1-yard capacity

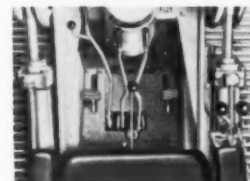
"BIG-PRODUCTION" FEATURES OF THE NEW NO. 955 AND NO. 933



40-DEGREE BUCKET TIP-BACK AT GROUND LEVEL. Large tip-back at low bucket height results in larger loads every pass—bigger production per day!



NEW OIL-TYPE CLUTCH. Stands up under continuous, repeated use. Cuts maintenance costs and time two ways: (1) Clutch adjustment, while easy, is seldom required. (2) Plate replacement is often unnecessary even at engine overhaul. Also helps step up production with easier shifting for operator.



CONVENIENTLY LOCATED LIFT AND DUMP LEVERS. All controls are within easy reach—bucket controls are a one-hand operation!

"DESIGNED-IN" COMFORT. Operator sits high in a comfortable seat, with excellent visibility of all bucket conditions.

PERFECT BALANCE. Weight distribution, engine horsepower and bucket capacity are balanced so that the full length of the track stays on the ground with a heaped load in the bucket.

NEW 3-GROUSER TRACK SHOES. Tested and proved on tough jobs, they deliver better traction—longer life.

OPTIONAL STARTING. Your choice of 6-volt electric starting for starting engine or 24-volt direct electric starting—from the seat, either way.

VERSATILE ATTACHMENTS. Your job range is increased by a variety of buckets and other useful attachments.

BRIEF SPECIFICATIONS

	No. 955	No. 933
Flywheel HP at sea level	70	50
Bucket capacity, cu. yd.	1½	1
Bucket tip-back at ground level, degrees	40	40
Bucket tip-back at max. lift, degrees	47½	48
Dumping height (center of hinge pin to ground)	128"	118½"
Weight (approx.) lb.	21,480	15,500

TRAXCAVATORS



MODERN HYDRAULIC SYSTEM. Full-flow hydraulic system filter protects moving parts against abrasive particles in fluid. Filter handily located for easy replacement of element.

Hydraulically balanced vane-type pump insures delivery of full volume and pressure of oil for thousands of hours. Operating valves in tank provide maximum protection against damage and dirt. Closed hydraulic system—no vents or breathers—prevents entrance of dirt.



HIGH REACH. Plus strong box section arms for rugged service. Box-type cross brace prevents twisting or bending.

PLENTY OF POWER. Power is ample to "bury" the bucket and provide fast lifting action and positive dumping under all load conditions.

BALANCED UNITS for BIGGER PROFIT!

Designed from the ground up as excavating and loading machines, these two new CAT*-built Traxcavators* are balanced for bigger production at lower cost. Built and backed by one manufacturer, they give you all the advantages of single manufacturing responsibility. With practical, advance-design features, they're engineered to outproduce ordinary tractor-shovels of the same capacity. You'll find these units the handiest tools in your line-up. Get the money-making picture from your Caterpillar Dealer—ask for a demonstration!

Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Ill., U. S. A.

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

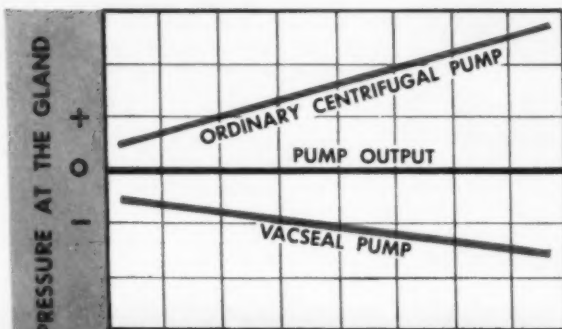
**NEW
BIG-PRODUCTION
TRAXCAVATORS**

ANOTHER EXAMPLE OF CATERPILLAR LEADERSHIP IN ACTION

VACSEAL PUMP

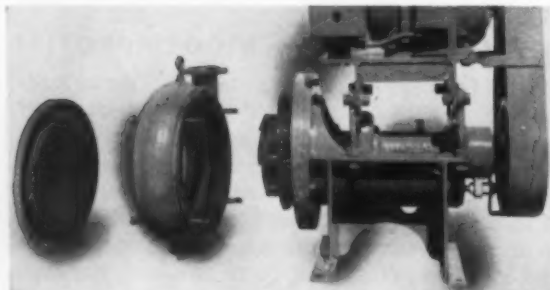
"The harder it pumps the better it seals"

VACSEAL supremacy rests on the *original* VACSEAL impeller design that eliminates leakage at the pump gland. The harder it works the tighter it seals—while the conventional centrifugal pump shows pressure build-up at the gland with increase of speed. Because of this advanced pump design, materials being pumped do not come in contact with the packing or the shaft sleeve. Result — no leakage and greatly reduced shaft wear! The rugged VACSEAL handles all types of material, including: abrasive pulps, acid and corrosive solutions, tailings, semi-solids and many other difficult to handle materials.

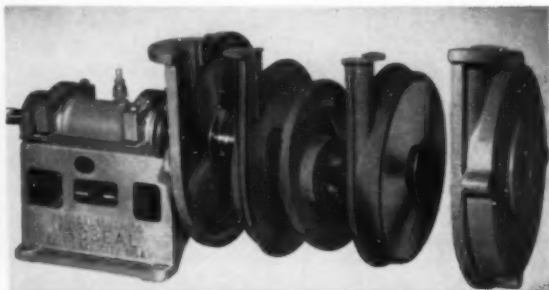


When VACSEAL PUMP is operating the pressure on the gland is less than atmospheric pressure.

VACSEAL PUMPS are available in many models, including: fixed or replaceable rubber linings and all alloy types and in sizes ranging from 1½" to 8". Write for additional data and performance records on these pumps. No obligation.



Fixed rubber lining or all alloy pump



Pump with replaceable rubber liners

OTHER GALIGHER PRODUCTS

Commercial and Laboratory AGITAIR
Vertical VACSEAL Pump
Acid-proof Sump Pumps
Laboratory Ball Mills
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How New Mexico copper mine speeds tractor work



One Tournatractor clears rock from highway.

The other cleans pit floor around shovel.

WITH mostly rock to handle on a 6-day week, year-round basis, a large open-pit copper mine in New Mexico uses 2 Tournatractors as utility tools.

These rubber-tired tractors clean up around large stripping shovels. They also keep haul roads and highways clear of rock, traveling over pavement without damage. When mixed dirt and rock are encountered, one unit pulls a 20-yard scraper; the other, a Rooter. In spare time, Tournatractors do a wide variety of odd jobs, including stockpiling, unloading supplies, pushing railroad cars, etc.

Their chief advantage for this scattered work is their speed. They can go anywhere — across the pit floor or over pavement — at speeds up to 19 mph. With instant-shift transmission and 8 mph reverse, they work 2 to 3 times faster than crawlers on most pushing and pulling jobs.



See for yourself

We will be glad to demonstrate a Tournapull or Tournatractor in your pit. They're better tools than ever since Westinghouse Air Brake's quality manufacturing tradition has been added to LeTourneau's earthmoving leadership.

Tournatractor — Trademark
Tournapull, Rooter — Trademark Reg. U. S. Pat. Off. T-472-M-b

Here is what other
pit owners say about
TOURNATRACTOR:

Illinois Coal Mine — "There is not a crawler-type machine made that will move the amount of dirt Tournatractor will."

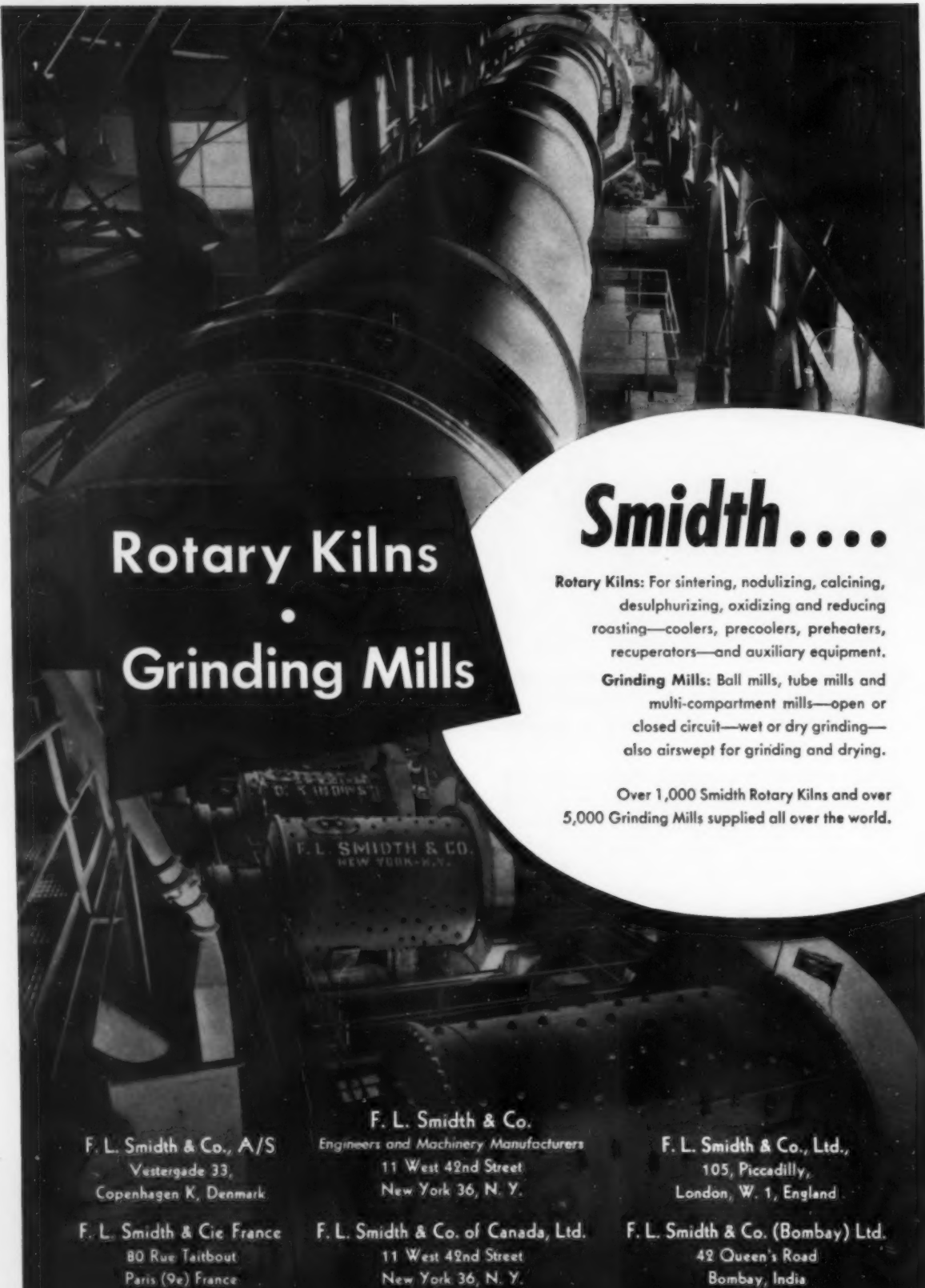
Ohio Cement Plant — "Moves as much shale in ½-day as crawler can in full day—and has saved us moving costs and delays."

Texas Iron Mine — "Where speed, mobility and power are essential, it is the best machine I have ever seen."

Arkansas Bauxite Mine — "Serves us well. Mobility lets it easily handle our large number of scattered small jobs."

Kentucky Coal Mine — "Does about twice the work of a crawler on straight dozing or clearing the coal seam."

LeTourneau-Westinghouse Company, PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company



Rotary Kilns • Grinding Mills

Smidth....

Rotary Kilns: For sintering, nodulizing, calcining, desulphurizing, oxidizing and reducing roasting—coolers, precoolers, preheaters, recuperators—and auxiliary equipment.

Grinding Mills: Ball mills, tube mills and multi-compartment mills—open or closed circuit—wet or dry grinding—also airswept for grinding and drying.

Over 1,000 Smidth Rotary Kilns and over 5,000 Grinding Mills supplied all over the world.

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ELIMINATE TIME-WASTING DRILL STEEL CHANGES!



You can quickly interchange both TIMKEN® rock bit types on the same drill steel—right on the job

TIMKEN® multi-use and carbide insert bits eliminate the time wasted in going after a different set of steels whenever bit types are changed. Timken rock bits are interchangeable. Dozens of different bits fit the same drill steel. And it takes only a minute to unscrew one type of Timken rock bit and screw a different type bit on the same drill steel.

With Timken rock bits, your men can quickly switch to the most economical bit as the ground changes—right on the job. And because dozens of different Timken multi-use and carbide insert bits fit the same drill steel, you don't have to carry a large drill steel inventory.

Both Timken multi-use and carbide insert bits are made from electric furnace Timken fine alloy steel. And their special shoulder union keeps drilling impact from damaging the threads.

If you have a drilling problem, call our rock bit engineers. They'll be glad to help you. And there's no obligation. Just write: The Timken Roller Bearing

Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be used.



WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant-gauge holes, small diameter holes, very deep holes.

*... your best bet
for the best bit...
for every job*

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.



IT TAKES MACKS TO MAKE THE GRADE

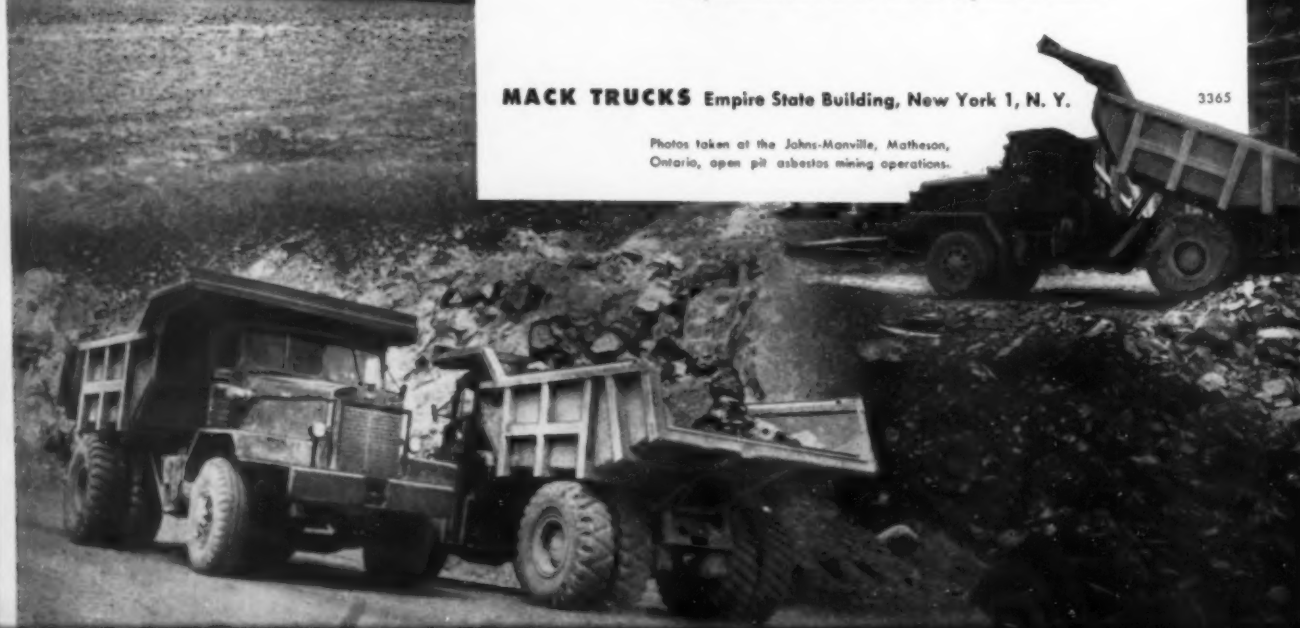
Mack trucks, like the 22½-ton LV's shown here, are always on the job...moving ore, earth, and overburden. Under huge shovels on the lowest pit levels...up difficult grades...to processing or dumping sites, these untiring Macks move with power to spare—on year-in, year-out service.

For maintaining uninterrupted 24-hour schedules, for reducing operating and maintenance costs...mine owners and operators find there are no equals to Macks.

MACK TRUCKS Empire State Building, New York 1, N. Y.

3365

Photos taken at the Johns-Manville, Matheson, Ontario, open pit asbestos mining operations.





R. E. Brott, Montana mine* tramway foreman

"Union Oil lubricants... keeping our ore moving"



"Union Oil lubricants play a major part in keeping our ore moving from mine to mill the year around.

"In this Montana mine we operate a 1¼-mile aerial tram to transport the ore down the face of a mountain. The tram's 13,100-ft. 1½" haul cable is moved along at 550 feet per minute by a G.E. 150-h.p. wound rotor type motor.

"Naturally, there are surges on the cable as 40 one-ton ore buckets are loaded and unloaded... and these surges can be rough on shaft bearings as well

as cables. The shaft bearing problem we've solved with Union's Unoba Grease, which resists these shock loads well, and Union's Marok and Red Line 100 Oil give extended life to both the haul and 1½" track cables."

Throughout the industry Union lubricants are reported to be doing an exceptional job helping to keep ore costs down. These same fine products are immediately available from your nearby Union Oil representative. Why not put them to work for you?

**Name on request.*



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NEW H-5 1/2-YD., 9-TON

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

Gentlemen:

Send me your new H-5 Bulletin. This crane interests me for _____ work.

(type of job)

Name _____

Company _____

Title _____

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91H55

Hydrocrane Mounts on Conventional Truck

Completely new from outrigger feet to boom tip, this powerful 9-ton, 1/2-yd. Hydrocrane brings you work ability of heavy carrier-mounted cranes at small crane cost. Patented hydraulic outriggers permit mounting crane-excavator on a commercial motor truck, new or used, without sacrificing any basic crane working capacity.



New truck, inexpensive used truck, a truck you now own—the new H-5 Hydrocrane can be mounted on any standard commercial truck you choose.

Check these outstanding advantages—

Unmatched precision control of loads.

High-lift, three-piece boom (extra equipment at added cost) gives you 50 feet of reach, retracts hydraulically to 25 feet for travel. Boom and hydraulic fittings can be connected and machine working in less than ten minutes after arrival at job site.

12-ft. telescoping boom action—from 24 feet to 36 feet for standard two-piece boom, from 38 feet to 50 feet for high-lift boom, plus 20-ft. jib extension.

50-mph top highway speed.

Every work function fully hydraulic.

Up to 240-fpm line speed.

Available with clamshell, crane hook, magnet.

Optional remote truck control from crane cab.

Meets highway laws for over-all length and axle loads (depending on truck selection).

See it in action

Find out what the new H-5 Hydrocrane can do for you. Ask your Bucyrus-Erie distributor for a demonstration.

BUCYRUS-ERIE COMPANY

1880

South Milwaukee, Wisconsin

1955

75 Years of Service to Men Who Shape the Earth



Du Pont Blasting Team Improves Fragmentation, Reduces Cost In Long-Hole Blasting



1, MAKING A PRIMER with Du Pont MS (millisecond)* Delay Electric Blasting Cap in $1\frac{1}{2}$ x 16 Gelex #1 dynamite. This iron-ore mine uses MS Delays in both shrinkage stopping and long-hole work.



2, LOADING PRIMER into long hole. In this type work, use of MS Delay Electric Caps virtually eliminates cutoffs and greatly decreases overbreak. Damage to walls or ribs is minimized, as is dilution of the ore.



3, BLASTER CONNECTING the round. These short-interval delay caps give improved fragmentation . . . materially reduce vibration and smoke . . . allow greater efficiency in use of dynamite.



4, FIRING BLAST with a Du Pont CD-48 Blasting Machine. Working as a "team," MS Delay Caps and other Du Pont products give greater blasting efficiency . . . more safety. Why not try a Du Pont "team" in your mine?

You can get further information on MS Delay Electric Blasting Caps or any other member of the Du Pont blasting "team" from Macondray and Company, Inc., China Bank Bldg., Manila; or E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., 111 Sutter St., San Francisco, Cal.

*"MS" Delays with copper or iron wires are available in following delay periods: MS-25, -50, -75, -100, -125, -150, -175, -200, -250, -300, -350-400, -450, -500, -600, -700, -800, -900, -1000



DU PONT EXPLOSIVES

Blasting Supplies and Accessories



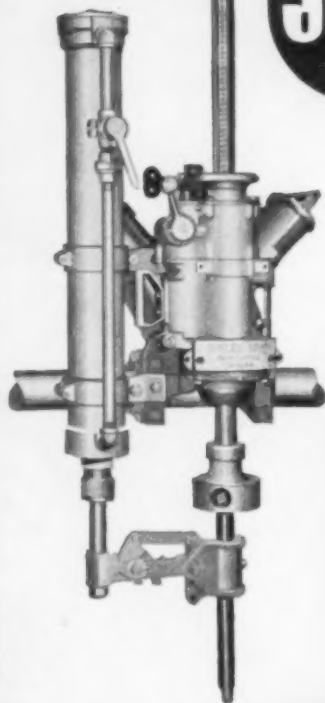
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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Piston motor or Vane motor

**MAXIMUM POWER -
MINIMUM AIR
CONSUMPTION**

JVR



New reversible version of the world famous JV underground drill. Delivers the same power, speed and dependability. Piston motor excels in high torque characteristics over entire speed range. New JVR features include adding of rods by drill power with reversible motor, right-hand threaded feed screw, rod adapter and built-in waterswivel—features which greatly increase both blasthole and coring footage over conventional drills requiring manual rod handling. Standard chuck assembly optional. Net weight range: 270 to 475 lbs.

**MAXIMUM POWER -
MINIMUM WEIGHT**

VEG



New Vane motor powered version of JV. Outstanding feature is lightweight, compact construction. Drill can be speedily dismantled into two convenient units for ease of transportation. One man can readily move and set up. VEG has direct bevel gear drive to swivelhead, with optional ratios of 1.5 to 1, 2 to 1 and 3 to 1. Net weight range: 230 to 360 lbs.

JV, JVR & VEG Rated Coring Capacity

E - 800' B - 450'
A - 600' N - 350'

All above drills can be fitted with 3 1/4", 4 1/2" (standard) or 5 1/8" (piston diameter) rod puller.

DRILLS • BITS • EQUIPMENT • CONTRACTING
The World's Most Complete Diamond Drilling Service

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Atlantic, Gulf and Pacific Co. of Manila, Philippines. • Shiro Trading Co., S. A., Tokyo, Japan. • Boyles Bros. Drilling Co. Ltd., Newcastle-on-Tyne, Eng. • Formac S. A., Rio de Janeiro, Brazil. • Claude Angwin (Pty) Ltd., Johannesburg, South Africa. • Wiese & Co., Ltd., Lisbon, Portugal. • I. H. Hanna, 331 Santa Cruz, San Isidro, Lima, Peru • Haehre & Co., A/s., Oslo Norway. • International Machinery Co., Santiago, Chili. • Manufacturers Overseas, Inc., New York, U.S.A. (agents for Turkey, Italy, Austria, Yugoslavia). • Dimitry Scalistiri, Athens, Greece. • Thomas M. Nevin Y Cia., S. A. Mexico, D.F. • Larsen & Toubro (Pakistan) Ltd., Karachi Pakistan.

Drifts and Crosscuts

The United States and The Philippines

This special Philippine Issue of MINING WORLD will be just like going back to the Islands for a large number of United States engineers. Wherever they may be now, they all know that it was their skills that made the mining industry in the Islands. This was only natural because the Philippines were part of the United States until the Republic of the Philippines was formed on July 4, 1946. While independent as a nation today the Philippines mining-wise are still part of the United States. Key management personnel returned to or stayed in the Islands after the war, heavy equipment for mining and milling is made in the United States, and Filipino engineers are being trained by professors from the United States with and to use United States equipment and methods.

This special Philippine Issue of MINING WORLD is a justly deserved tribute to the mining companies and their staffs for the outstanding work they are doing. One of the most important accomplishments has been the very fine relations between the government of the Republic of the Philippines and the mining industry. Together, they both have grown since the end of World War II.

The new nation has had many difficulties to overcome in establishing itself while simultaneously rehabilitating the war-damaged cities and industries. The mining industry has rebuilt magnificently from piles of bullet-torn, burned-out equipment and buildings.

The determination of the Philippine government to foster a strong mining industry is forcefully phrased in President Magsaysay's special message to MINING WORLD readers on page 50. The effective work of the Philippine Bureau of Mines, the recently enacted laws favorable to the mining industry, and the start of awareness of mining opportunities have resulted in a "Philippine Mining Boom." The "Gold Boom" is still remembered and frequently referred to in the Islands. The new boom is actually a "Base Metal Boom" and events of the last four months indicate that it has only started.

MINING WORLD is honored in the presentation of this special issue at such an opportune time. The Philippines with increasing copper production is assuredly the most important event in today's mining world.

Why Uranium Miners Dig Faster

Recent published data followed by the report of United States Atomic Energy Commission chairman, Lewis Strauss, at the Geneva Atomic Energy Conference indicate that a "controlled fusion hydrogen engine" may become a fact.

The hydrogen bomb has been achieved by both Russia and the United States, but its reaction is uncontrolled. Quite possibly, lithium six deuteride

(Li^6H^2) is converted to helium and is triggered off by the sun-like heat generated uranium fission.

In any such machine one kilogram of the lithium deuteride would release energy equivalent to 60,000 tons of TNT as fusion took place to form beryllium 8.

The new hydrogen engine, which is being secretly studied by Russia, Great Britain, France, and the United States, would be controllable in that the nuclear fission would not be started from a uranium fission fire. The necessary heat might be generated by a beam of electrons from a linear accelerator which develops enough energy, at virtually the speed of light, to force a beam of electrons through steel plates. Regulating the electric power input into the accelerator might then control the rate of fission in the engine.

Linear and other accelerators have been perfected and built. Among them are those developed at Stanford University which use Varian klystron tubes to speed electron flow, and several betatron types developed at the University of California. Experiments will prove the possibility of their use in starting fission fires.

What does all this mean to the uranium miner? First, if this becomes a practical fact, the peacetime uses of uranium will disappear. Second, it could be less of a potential market for uranium because it could mean early obsolescence of the uranium-fueled electric generating plants on the drawing boards and under construction by the power companies.

So what does the Colorado Plateau miner say and do about this? He just mines faster as he has a government guaranteed market until March 31, 1962.

Government Needs Men Like Howard Young

Private industry and business of all kinds and all sizes in the United States are fortunate that the leader of the mining industry, Howard I. Young, has so forcefully and ably defended his and their services to the federal government.

The Comptroller General brought charges against Mr. Young covering his actions during his services as Deputy Administrator of the Defense Materials Procurement Agency during the Korean War.

Mr. Young and Jess Larson, former administrator of General Services immediately proved these charges false and unwarranted. In so doing they both again proved their outstanding services to the nation.

It is most unfortunate that the government—which is all citizens—will find it very hard to get industry leaders to work for it when needed most, for free or for money, because of such attacks and charges.

What the government needs is more men of the calibre of Howard Young and Jess Larson who drop their own personal affairs to give unselfish service to the government in its time of need.

MSA

SAFETY EQUIPMENT HEADQUARTERS

... a complete product line
that brings greater safety,
increased production
to mining operations

EDISON R-4 ELECTRIC CAP LAMP - M.S.A. TYPE K HAT

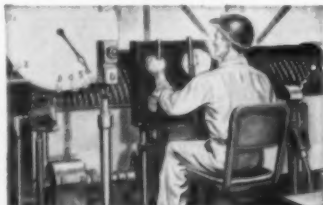


Today's modern mining methods call for more and better illumination. You'll find a dependable and profitable answer in the Edison R-4 Lamp. Its brilliant, unfailing beam permits miners to operate modern equipment at its greatest capacity, safely.

The famous Type K Skullgard is strong, light, durable, comfortable. Unaffected by oil, water, perspiration. Provides maximum head protection. Write for details.

M.S.A. HOISTPHONE

Dependable voice communication between hoisting engineer and moving cage, or at any level. Ideal for load leveling, shaft repairs, inspections. Also available—the M.S.A. MinePhone for instantaneous communication of orders to moving locomotives for improved haulage.



M.S.A. SELF-RESCUER

For immediate breathing protection in emergencies. Vital to the miner while traveling through carbon monoxide to fresh air. Available in cache assemblies for storage throughout the mine, or in individual carrying cases. U. S. Bureau of Mines Approved.



M.S.A. CHEMOX®

Provides complete breathing protection in any atmosphere for a minimum of 45 minutes. Chemox generates its own oxygen from replaceable chemical canister. Weighs only 13½ lbs. Comfortable in service. U. S. Bureau of Mines Approved.



M.S.A. McCAA TWO-HOUR OXYGEN BREATHING APPARATUS

Assures complete breathing protection in unbreathable atmospheres for a minimum of two hours. U. S. Bureau of Mines Approved.



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Light weight, compact, comfortable. A dust respirator that provides maximum protection. U. S. Bureau of Mines Approved.



M.S.A. "ALL-SERVICE" MASK

Dependable breathing protection against smoke and toxic gases including carbon monoxide singly or in combination, where there is no oxygen deficiency. Unit is U. S. Bureau of Mines Approved.



M.S.A. PNEOLATOR

Automatic artificial respiration device that assures maximum chances of recovery to those overcome by poisonous gases, electrical shock or other causes of asphyxia. Pneolator is accepted by the American Medical Association.



M.S.A. MIDGET IMPINGER

A portable instrument for quick and dependable dust sampling. Entirely self-contained and hand operated. Ideal for dust control and survey work.

OTHER M.S.A. PRODUCTS FOR THE MINING INDUSTRY

Belts—Goggles—Safety Clothing—Carbon Monoxide Tester—Methane Detectors and Recorders—Stretcher Outfits—First Aid Kits and Materials. Send for our Mining Catalog for complete details On all products.



When you have a safety problem, M.S.A. is at your service. Our job is to help you.

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Vancouver, New Glasgow, N.S.



Capitol Concentrates

President Vetos Bill To Extend USA Purchases of Mn, WO₃, Be, Cr, Cb-Ta

On August 14th President Eisenhower vetoed H. R. 6373 which would have continued the domestic minerals purchase program under the terms outlined below. The reason Eisenhower gave was that purchases should not be continued "under the guise of defense needs when such needs do not exist."—Ed.

The bill to continue the federal government's domestic mineral purchase program was approved by both Houses of Congress on August 1 and sent to the White House for Presidential approval or veto.

The measure passed was H. R. 6373 by Representative Engle of California to amend the Domestic Minerals Program Extension Act of 1953. Senate amendments to the bill were rejected by the House-Senate conference committee. Therefore, it provides for additional purchases of manganese, tungsten, asbestos, mica, beryl, chromite, and columbium-tantalum in amounts not to exceed twice the total authorized under purchase programs existing on July 1, 1953. Gross purchase transactions for all programs are limited to \$150,000,000.

The bill specifically directs that within 90 days the Wenden (Arizona) manganese depot shall be reopened and two new manganese ore-buying depots shall be established, one in the Ozark-Cushman area (Arkansas) and one in the southern Appalachian area. The limitation in the car-lot manganese program, excluding producers of more than 10,000 tons of annual production from participation, is amended to apply only to producers which produced and sold more than 10,000 tons of 40 percent manganese ore in any one of the four calendar years preceding 1955.

If signed by the President, the bill should make possible the continuance of each of the programs until their normal expiration dates. These dates are: June 30, 1958, for tungsten and manganese; October 1, 1957, for asbestos; June 30, 1957, for chrome, beryl and mica; and December 31, 1958, for columbium-tantalum.

The Wenden (Arizona) manganese depot was closed in May when its quota of 6,000,000 long tons of recoverable manganese was reached. At the present rate of shipments, the Deming (New Mexico) quota of 6,000,000 long ton units of recoverable manganese will be exhausted within the next 12 months. Similar, or earlier, termination dates are estimated for the tungsten and asbestos programs under the original quota assignments. Deliveries and outstanding orders have filled the columbium-tantalum quota, and cut-backs on future deliveries have been announced.

Director Flemming of the Office of Defense Mobilization strenuously opposed H. R. 6373 and similar legislation. He maintained that the materials are not needed for the stockpile and that if economic relief is to be given to the mining industry, the funds should come from other sources than the stockpile or Defense Production Act funds which he administers.

The Department of Interior and the Bureau of the Budget endorsed the bill as passed.

The Senate amendments which were dropped would have included antimony in the purchase program, set up a manganese depot in the Cuyuna Range, and established a mining and metallurgical research unit in Minnesota.

• Defense Production Act Is Extended

Congress voted a one-year extension to the National Defense Production Act which continues the stockpiling of strategic metals provisions and standby allocation authority.

The measure, however, contains a limitation on the employment of dollar-a-year men serving as volunteer executives in government agencies and bars them from policy-making posts. The limitation, it is said, will affect mainly the Business and Defense Services Administration where some 28 business executives are now serving, but none in a policy-making job. As the *American Metal Market* commented: "It promises to be a remarkable demonstration of how to eliminate a few rodents by burning down the edifice where they lived."

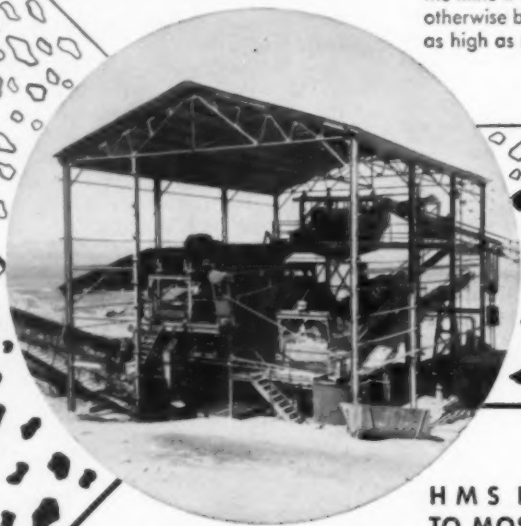
• Silver Repeal Hearing Is Recessed

The silver consumers bloc which pressed for hearings on S. 1427, a bill to repeal the Silver Purchase Act, was astonished to find the government agencies very lukewarm about the deal, even the U. S. Treasury. Although some 30 western senators requested that hearings be indefinitely postponed, Senator Paul H. Douglas of Illinois, who is chairman of the subcommittee of the Senate and Banking Committee to which the bill was assigned, refused to do so. However, not only was the government's testimony unsatisfactory to Senator Douglas, who fancies himself as a monetary economist, but Assistant Secretary of the Interior for Mineral Resources Felix Wormser told the subcommittee that repealing the Silver Purchase Act might have an adverse effect upon the western mining industry. Douglas promptly recessed the hearings until the next session of the Congress, and whether he will resume them to allow industry witnesses to testify is a moot question.

At any rate, with 30 senators in the bag, plus their colleagues, passage of S. 1427 would seem extremely dubious and the hearings a waste of time.

WOULD YOU SPEND 15¢ to save dollars per ton?

Then you should seriously consider H M S (Heavy Media Separation) as your first step in ore beneficiation **regardless of how the final concentration is achieved.** Wemco H M S costs as little as ten to twenty cents per ton. Right at the mine it can partially eliminate gangue that would otherwise be hauled and processed at total costs as high as several dollars per ton.



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The Wemco Mobil-Mill is H M S in its most practical form. The cost is predetermined and low because it is a complete plant that is pre-engineered and pre-fabricated. It can be assembled close to the mine (or even underground). And, the Wemco Mobil-Mill is so thoroughly proven in design that it operates from the first day. Mobil-Mills are available to fit your problem exactly. Capacities range from 5 to 500 tons per hour.

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THE THIRD LEG

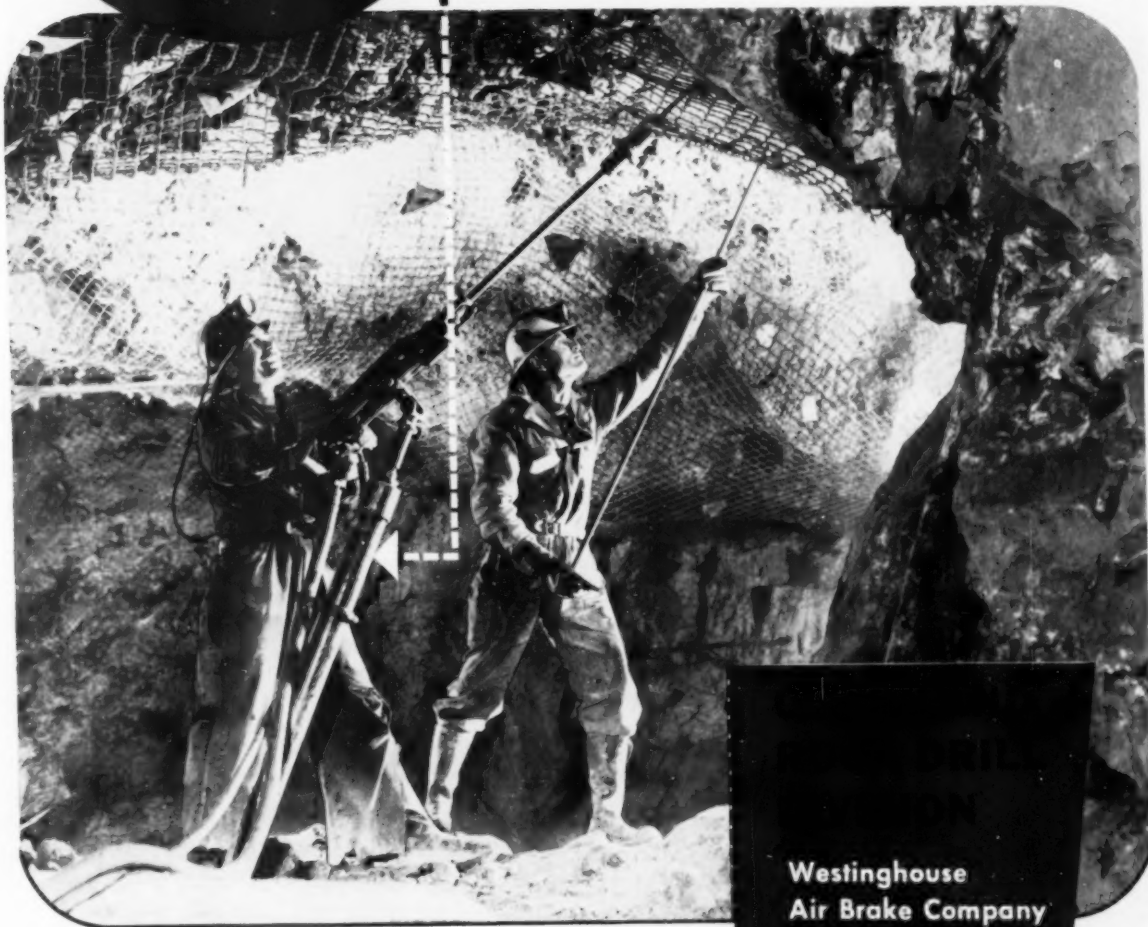
Any miner can stand on his own two feet but your PROFITS stand on this THIRD LEG. Six combinations are available in lightweight aluminum single-extension or telescopic legs with a variety of drills to meet every drilling condition. Use it for drifting, stoping or bolting (Set the bolts too!)

Use the CLEVELAND H10AL drill with either AL90 (single extension) or the AL92 (telescopic) air leg. All controls are located on or near the backhead and the third hose is eliminated. Use the fast, hard hitting H12 drill with the AL92 (single) or AL93 (telescopic) air legs. Or use the AL91 or AL93 legs with your own drills. Just tell us what you want and we will demonstrate in your own mine.

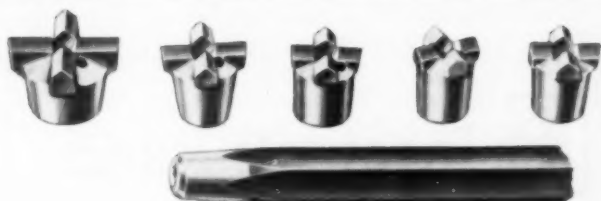
CRD One-Use bits with ANY drill spell PROFIT!

Write for bulletin RD30 on Air Legs and Bulletin RD29 on Bits.

RD-73

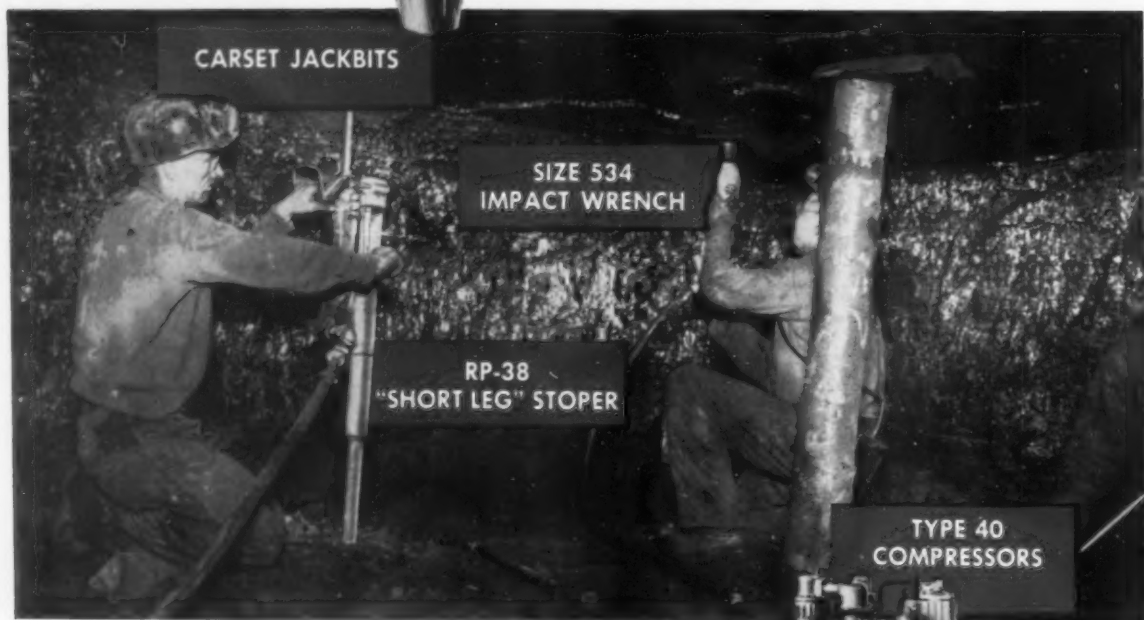


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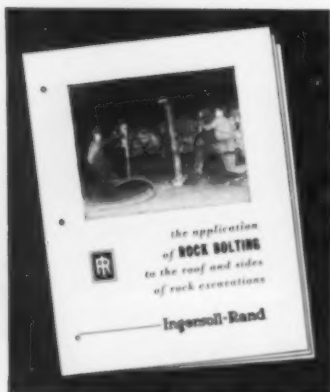
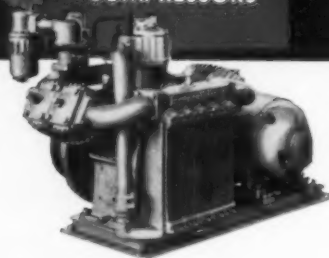
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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

September 1955

—INTERNATIONAL PANORAMA—

SAN FRANCISCO, CALIFORNIA—Output of aluminum in the United States in the first six months of 1955 reached an all-time high figure of 759,867 short tons.

HAVANA, CUBA—Under a new decree the Cuban government has the right to buy all radioactive minerals for 30 days after production. After that Cuban citizens have purchase right. Sales to foreigners must be approved by the Defense Ministry.

CUBA CITY, WISCONSIN—American Zinc, Lead and Smelting Company is developing a new mine on recently acquired properties of Cuba City Mining Company. Mine production will start in 1956 at a rate to produce 12,000 tons of zinc concentrate per year.

KINGS MOUNTAIN, NORTH CAROLINA—The Carolina Mines, Inc. is developing a new kyanite mine between Kings and Crowder's Mountain.

SANTIAGO, CHILE—Output of copper for 1955 in Chile is estimated to reach 420,000 metric tons. This is a big increase over 320,000 in 1954.

SOUTH FRIENDS STATION, TENNESSEE—American Zinc, Lead and Smelting Company mined its first zinc ore from the new Young mine here the first week of August. Production is to be raised to 1,000 daily tons by November.

PORT PIRIE, AUSTRALIA—The first shipment of uranium (davidite) concentrate from the Radium Hill mine has been received here for refining to uranium oxide.

WENATCHEE, WASHINGTON—Revere Copper and Brass, Inc. has filed application with the federal government for a Certificate of Necessity for a rapid amortization of a new 60,000-ton-per-year aluminum plant here.

CORPUS CHRISTI, TEXAS—The American Smelting and Refining Company is increasing production of its electrolytic zinc plant here about one-third to 9,000 short tons per month. Zinc fume from the company's lead smelters will be the source of zinc.

TEMAGAMI, CANADA—One of the highest grade shipments of copper ore ever made in Canada was the initial shipment recently made from Temagami Mining Company. The 65 tons of ore assayed 29.3 percent copper.

JOHANNESBURG, UNION OF SOUTH AFRICA—A new gold mine is expected to be developed in the eastern portion of the Klerksdorp Farmlands. It will be north of the Vaal Reefs Exploration and Mining Company, Ltd.

MEXICO D. F., MEXICO—The United States Steel Corporation has had a geologic field crew investigating fluorspar deposits in the State of Coahuila.

NATRIUM, WEST VIRGINIA—A 5,000-ton-per-year granular titanium plant is planned to be built here by Columbia-Southern Chemical Corporation and the British firm Imperial Chemical Industries, Inc. Plant construction awaits federal purchase contract for the new form of titanium from the new low-cost process.

SAN FRANCISCO, CALIFORNIA—Plans for major expansion in aluminum output have been announced by the Reynolds Metals Company and the Aluminum Company of America. Reynolds will expand mine to metal facilities and build a new 135,000-annual-ton plant in northwestern Kentucky. ALCOA will build a new alumina plant at Palacios, Texas to treat 500,000 annual tons of bauxite.

WASHINGTON, D. C.—The Office of Defense Mobilization has permanently terminated accelerated amortization for new mines and plants to increase output of: asbestos, barite, beryl, chromite, columbite, tantalite, fluorspar, lead, manganese, molybdenum, rare earths, tungsten, and zinc. Suspended indefinitely are: antimony, bauxite, chemical chromite, cobalt, iron ore, and taconite. Remaining eligible are: copper, mercury, nickel, and selenium.

Public Hearing Set On Fluorspar Imports

The United States Tariff Commission has set hearings to determine if acid-grade fluorspar is being imported into the United States in such serious quantities, either actual or relative, as to cause or threaten serious injury to domestic industry producing like or directly competitive products.

All parties interested will be given opportunity to be present, to produce evidence, and to be heard at a public hearing in connection with this investigation to be held in the Tariff Commission building, 8th and E Streets, N. W., Washington, D. C., beginning at 10 A. M. on September 27, 1955.

Interested parties desiring to appear at the public hearing should notify the Secretary of the Commission in writing, at the Commission's offices in Washington, D. C., at least three days in advance of the hearing.

Magundi Acquires Numero Rhodesian Cu Properties

Magundi Copper Mines and Minerals Ltd. has been extremely active since it changed its name from Magundi Chrome Mines Ltd. (see MINING WORLD, July 1955, page 71) and diversified its operations.

It has purchased the outstanding interest in the Sisenga mine in Northern Rhodesia. Under an agreement with the North Charterland Exploration Company (1937) Ltd., it will investigate and explore the latter's concession area of about 10,000 square miles contiguous with the Mozambique and Nyasaland borders in Northern Rhodesia. In addition, Magundi has acquired an option to purchase the Inyati, Dora, and Makooi properties which are located in the Rusapi district of Southern Rhodesia. These have already been partially opened up.

The Sisenga mine is now producing copper concentrates by gravity methods and is advancing underground exploration by means of an incline shaft which is still being sunk. The first level is being driven and assays of 8.0 percent copper in an ore body 36 inches wide have been disclosed.

At the Allies mine, copper concentrate is also being produced in a plant in which additional tables will be installed. An incline shaft is being sunk and assays of 8.0 percent copper in an ore body 60 inches wide are reported.

Dewatering operations are being conducted at the Mtuga mine, and when completed will be started at the Munshiwemba mine. The proved reserves at these two mines are stated to be 294,000 tons averaging 4.0 percent copper. All are in Northern Rhodesia.



MALACANAN
MANILA

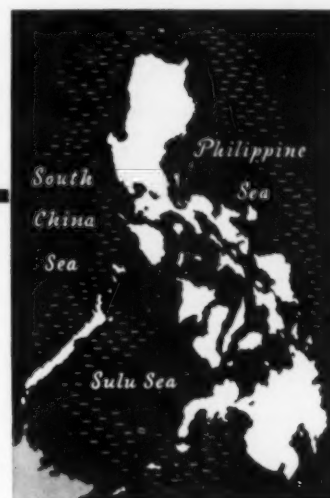
MESSAGE

Among the principal objectives of the Philippine Government is to give impetus to the development and exploitation of our mineral resources, for upon minerals and mineral fuels will largely depend the success or failure of our plan of industrialization. Surely our own industries cannot grow and prosper for any length of time without available raw materials from local sources.

We have mineral wealth but we need to dig it out of the ground first to be of any use to us. The job must be done as soon as possible. For this reason, we have to arouse greater interest in Philippine mining not only among our countrymen but among people of other countries as well. We have to attract both local and foreign capital to invest in our mines. This we propose to do by enhancing further the favorable climate for investments here, and likewise by offering to private enterprise the closest cooperation of our government entities in the promotion of the local mining industry.

I am highly pleased that the Mining World and World Mining Magazine, of world-wide circulation, will give Philippine mining the necessary publicity boost. This is, as it were, a timely shot in the arm.

Quirino
President of the Philippines



PHILIPPINE MINING TODAY

Is sparked by base metals boom as Atlas Copper expands to 6,000 daily tons...Palawan starts mercury production...New copper mines under development . . . Gold miners get aid

By GEORGE O. ARGALL, JR.
Editor

The Philippine Republic is the land of mining opportunities. What are these opportunities, why do they exist, will they get better? These are the questions that I went to the Philippines to try to answer; why I spent four weeks checking prospects in the rain-drenched tropical forest, observing the most modern heavy-duty, open-pit equipment being operated by natives, and talking to hundreds of leading mining officials, governmental leaders, and technical personnel.

The opportunities are there today. They are real. Who should take advantage of them?

★ United States mining companies seeking new mines.

★ Engineers—particularly those with production know-how.

★ Investment capital. Both company and individual opportunities exist. Already the Philippines have the largest United States private investments in the Far East.

★ Machinery salesmen seeking markets for United States equipment.

Mineralization Makes Opportunities

These opportunities exist because of one basic fact: widespread, intensive, and varied mineralization. No one knows what the true mining potentialities are in the Philippines. It is true that the well known Baguio and Paracale gold districts have been known for centuries and intensely prospected, but the recent discoveries of important chromite and mercury deposits on Palawan

Island which resulted in new mines and new mining districts prove more than ever the inadequacy of prospecting, and most definitely that the surface has not yet even been scratched.

Opportunities for new mines are many because outcrops are masked or covered by heavy jungles and landslides making prospecting difficult. Gold has been mined for so long that other minerals have been forgotten and overlooked. Adequate long-range venture capital has been nonexistent. Every successful mine literally has had to pay from the first round and pay both fast and big enough to finance all development and mill construction.

While certain government regulations and laws are onerous to both foreign capital and engineers, rapid and positive strides are being taken by President Magsaysay, who has unified the country and established a stable government which is making real progress in overcoming these difficulties.

Without exception, everywhere I went in the Philippines I was asked if I knew of any good engineers—from mine shift bosses to general superintendents—who would come to the islands to work. Literally a few tens of top engineers are keeping the mines running. Their skills and abilities are the equivalent of those of any other engineers in the world, but the majority are getting old. Unfortunately there is no younger management echelon to move up.

Here is a rough rule that many engineers use about salaries. Payment to be made in dollars to their United States bank account of about the same salary as they would make in the United States. This is about one-half of their Philippine salary and is always subject to a 17 percent Philippine exchange tax; sometimes the em-

PHILIPPINE MINING

September 1955

LEPANTO CONSOLIDATED MINING COMPANY
Copper-Gold

BENGUET CONSOLIDATED MINING COMPANY
Gold

BAGUIO GOLD MINING COMPANY
Gold

ITOGON MINING COMPANY
Gold

BALATOC MINING COMPANY
Gold

ACOJE MINING COMPANY
Metallurgical Chromite

MINDANAO MOTHER LODE MINES, INC.
Copper-Gold

CONSOLIDATED MINES, INC. (BENGUET CONSOLIDATED MINING COMPANY, Operator)
Refractory Chromite

Mankayan

Baguio

Sta. Cruz

Masinfoc

Candelaria

Manila

PHILIPPINE IRON MINES, INC.
Iron-Uranium

Larap

Paracale

Dact

SAN MAURICIO MINING COMPANY
Gold

MINDORO

MASBATE

SAMAR

PANAY

Bacolod City

Sangi

Cebu City

Tacloban City

Surigao

PALAWAN QUICKSILVER MINES, INC.
Mercury

Puerto Princesa

SIPALAY COPPER MINING COMPANY
Copper

Sipalay

ATLAS CONSOLIDATED MINING & DEVELOPMENT CORPORATION
Copper

SURIGAO CONSOLIDATED MINING COMPANY
Gold

Cagayan de Oro City

MASARA MINING COMPANY, INC.
Gold-Silver-Zinc Lead-Copper

MINDANAO

ATLAS CONSOLIDATED MINING & DEVELOPMENT CORPORATION
MATI IRON MINE Iron

Davao City

Masara

Mat



Legend

CITIES & TOWNS ● MINES ★
AIRFIELDS ■
SCALE IN MILES
0 50 100 150

ployer pays this. Then payment of the other salary half in Pesos which buys all essentials for a good living. Company houses and utilities, of course, are furnished at minimum cost.

Investors wishing to buy shares of Philippine stock can purchase Benguet Consolidated Mining Company on the New York Exchange. The Manila Exchange trades in Atlas Consolidated Mining and Development Corporation, Palawan Quicksilver Mines, Inc., Acoje Mining Company, Lepanto Consolidated Mining Company, Surigao Consolidated Mining Company, and many others. Trading in Philippine shares is also done on several stock exchanges on the West Coast of the United States, and further listing of Philippine shares on American exchanges is being planned.

Removal of Philippine government exchange restrictions on dividends payable to United States investors is of first importance in increasing venture capital flow to the Islands.

United States salesmen find a ready market for their equipment in the Philippines. This is both logical and natural because the mine operators used the same equipment in the United States before they went to the Islands. They know it, like it, and are buying more of it. In recent months there has been delay and red tape in getting import licenses. However, in no instance did I find that "dollar" allocations and import licenses were not being granted for necessary equipment and supplies. Delay has been a problem, particularly for the small operator who can't maintain extensive warehouse inventories. The recently enacted law, S. 384, which restricts "dollar" imports should favor the mining industry because mining falls in a blanket category in which dollar imports are not restricted. Mining is a dollar producing industry so there are no restrictions on imports of machinery and equipment.

Good Communications Fast Transportation

The Philippine Islands are a large geographical area with more than 7,000 islands. It would appear that communications and transportation would be a serious problem in any mine development. This is not true and, quite the contrary, intermine and Manila communications are better and cheaper than those among many mines in the United States. Short wave radio is the answer. Fortunately for the industry, many rugged and powerful sending and receiving sets were sold as surplus for only a few dollars by the armed services after World War II.

The airplane and, to a lesser extent, the helicopter have solved the transportation problem. Philippine Air Lines operates daily flights between the principal cities, with twice weekly or once weekly flights from Manila to the most distant outlying islands. With landing fields at or near all the major mines, personnel fly to Manila in the morning, complete a day's conference, and fly back to the mine in the evening. Emergency spare parts and weekly payrolls are regularly flown from Manila.

Helicopters have speeded up prospecting and mine examination work. Before the war it would take a week of hard travel to reach a prospect, say on the east coast of Luzon. Today a helicopter flies an engineer to a coastal beach or small jungle clearing near the mine in a few hours.

Philippine Laws Are Favorable

The Philippine government, from President Magsaysay on down, is interested in promoting the mining industries' welfare. An example of the bold yet progres-

sive assistance granted to the gold mines by the government is outlined in the chapter on gold mining. The progressive work of the Philippine Bureau of Mines is reported in detail in the chapter on "How The Government Aids The Mining Industry." For a miner new to the Philippines the Philippine Bureau of Mines is the first place to visit. A large staff of qualified engineers and geologists, many educated in the United States, is available for consultation and advice. Their records and data can save much initial background search and blind exploratory work.

Study of the chart "How Philippine Mining Laws and Taxes Compare with Requirements of United States Venture Capital Mining Companies" in the chapter on government mining aid shows that the laws are very favorable for foreign venture capital; still most important, revisions of laws now under study will make the Islands even a better place to mine.

Certainly the Philippines' initial 3-year, income-tax-free law applying to new mines is more favorable than the United States law. The rate of income tax is lower too.

How Laws Could Be Improved

Among the unfavorable laws and regulations is one which provides for leasing rather than ownership of new mining claims. Also, the regulation that limits company ownership to 250 claims throughout the Philippines if the claims are located on ore exceeding \$10.00 per ton in value with the added restriction that not more than 50 claims can be in one province. In the case of low-grade disseminated ores, a company is limited to 250 claims, all of which may be in one province.

The restrictions on number of claims that can be owned should be changed so that at least 200 claims can be owned in one province and at least a total of 500 in the Islands. Also, the work requirements should be increased and enforced on those claims in effect so that one owner must do more than file a continuing lease application to hold the claims.

The problem of obtaining mining engineering licenses and visas for technical personnel to come to the Philippines should be simplified. Far less than 10 percent of the post-war mining licenses, so important for practicing engineering, have been granted to United States citizens. A reciprocal licensing system between the Philippines and the most important mining states in the United States would overcome this problem.

As to visas, stabilization of the ever-changing requirements for entry of engineers would permit companies to know exactly what procedures are necessary and to follow them exactly. Proposed Philippine legislation to facilitate the entry of traders and investors into the Philippines will help to clarify this problem.

Abolition of the 17 percent exchange tax on the sale of foreign exchange (Philippine Pesos for United States dollars) has been under discussion. This would mean immediate and immense benefit to investors and engineers who have had to pay this tax on their dollar remittance of earnings.

Grateful acknowledgement is due the Philippine mining industry for pointing out the desirability of this special issue and for their complete and cordial cooperation in every phase of the project. Also to the Philippine government—President Magsaysay and his governmental staffs.

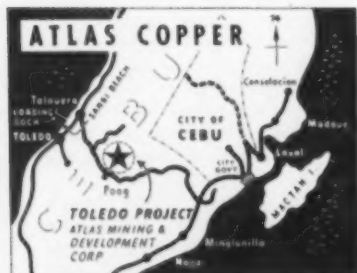
It is impossible to single out one or several individuals or companies for their special assistance. This Special Issue, *Philippine Mining*: Today and Tomorrow, is the collective work of the entire Philippine Mining Industry.



OPEN PIT COPPER mining at Atlas. The two-cubic-yard A-20-J Lorain shovel in the foreground is loading waste into a 22-ton end dump Euclid Diesel truck. A second Lorain shovel

at top center is working in high grade ore in the core of the ore body. A Mitsubishi Fuso Diesel truck is returning to this shovel after dumping 13 tons of ore in crusher building at top.

Atlas Sets Pace For Copper Boom



The Orient's largest open-pit copper mine and 4,000-ton-per-day flotation mill have been operating for six months in the Philippine Islands. This is the Atlas Consolidated Mining and Development Corporation's Toledo mine on the island of Cebu. As the first ore was being delivered to the crushing plant on February 23, 1955, Col. Andres Soriano, Atlas president and "Copper King of the Philippines," was ordering his engineering staff to

take all necessary steps to increase the scale of operations to 6,000 daily tons.

A. Soriano y Cia. is the consulting engineering firm for Atlas.

While not big by United States open-pit standards, Atlas has been and will continue to be a pace-setter for Oriental mining. To date, Atlas has proven that it is possible to operate an open-pit copper mine in the rain-drenched tropics at costs comparable with similar-sized operations in other parts of the world. Atlas has shown that the Filipino workman with proper supervision can become proficient as a shovel runner or cat skinner; in fact, Col. Charles M. Smith, vice president and mining engineer, believes that Atlas mining costs can be cut because of the lower wage scales in the Islands. Operations were predicated on a U.S. \$0.24 cost for producing one pound of copper. June operating costs are in Table No. I. These June costs, in pesos per ton are

below estimated (in brackets) when mine was in planning stage. Mining, 1.356 (1.750); crushing and milling, 2.258 (2.500); and Toledo office overhead only 0.368 (0.60).

By training native labor, Atlas has also proven that large, heavy-duty, United States mining and milling equipment is the key to low costs despite the ready availability of thousands of very low-wage workmen.

What Makes Toledo a Mine

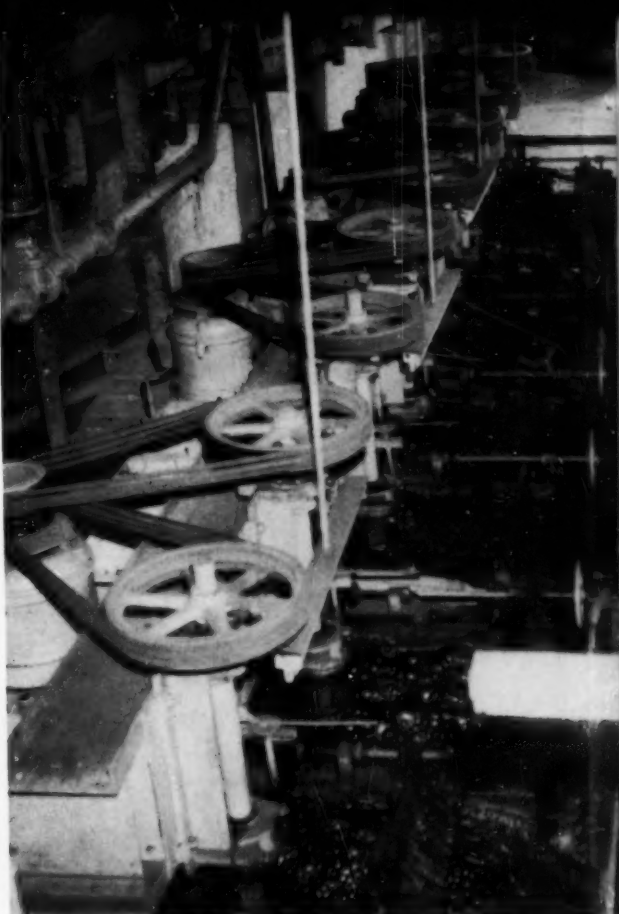
Atlas is fortunate because its ore body is located only 16 kilometers, by adequate roads, from major ocean ports; a large tonnage of open-pit ore with a very favorable stripping ratio is available. Also, all the ore contains recoverable gold; the ore minerals—chalcopyrite and pyrite—are coarse, thus obviating the necessity for fine grinding; there are no interfering minerals for flotation; and the diorite



MARCY 86 ball mills and 6-foot Dorr rake classifiers are the primary grinding units. These machines were used at Masbate Consolidated before World War II for grinding gold ore.



WASTE STRIPPING on the uppermost 360 bench has all been done with Caterpillar tractors and Carryalls. Maximum haul is 1,200 feet to disposal area southeast of pit.



DENVER SUB-A flotation machines built by Mitsubishi Heavy Industries Company make the chalcopryite pyrite separation. The two 8-cell banks float chalcopryite away from pyrite.

By Expanding To 6,000 Tons Daily

gangue does not present any problems in crushing or grinding.

Of probably greatest importance is that Atlas has been able to establish a 4,000-ton-per-day mill at a small capital investment per ton of capacity. This is because the Masbate Consolidated Mining and Development Corporation, which is one of the three companies merged to form Atlas, had a 4,000-ton gold cyanide plant on nearby Masbate Island. True, this plant was equipped before World War II, but fortunately had been cared for by the Japanese during the occupation rather than damaged by fighting or guerrilla action.

Marketing of concentrate presents no problems as it contains no deleterious elements. Atlas has a favorable contract with low-cost ocean shipping to Mitsubishi Metal Mining Company, Ltd.'s Naoshima copper smelter on Naoshima Island in Japan's Inland Sea. Alternately, concentrates are shipped

to American Smelting and Refining Company's Tacoma, Washington smelter. (First shipment, 1,091 short tons assaying 24.46 percent copper was made on July 11.) Copper output has climbed steadily since the mill went into operation. Production by months in pounds of copper has been: March, 225,629; April, 1,100,769; May, 1,115,820; June, 1,268,420; and July, 1,815,613.

Unfavorable Aspects, Too

Atlas has its problems, too. They are all recognized by the engineering staff, and plans and preparations are being made to overcome them where technically possible.

The first problem, with no easy solution, is waste disposal. Overburden from the lower benches must be hauled uphill to dump areas west of the pit. With the ore body cropping out along the side of a mountain, dipping under the mountain, and extending

below the bottom of the Ilag River, there is no other method to get this waste out of the pit area.

Because of the topography, about 55 percent of the ore will have to be mined by underground methods. Atlas has already located a shaft site in the footwall adjacent to the crushing plant, and plans call for gradual underground development as the pit is mined.

Adequate water supply was a problem during initial operations. It was solved by the diversion of water from nearby rivers. Tailing disposal areas will eventually be necessary. There are no technical difficulties because nearly level areas, now cultivated, are several kilometers down river. However, there will be the added cost.

Another problem for which preparations have been made is the mining and milling of clay and gouge zones in the ore. Despite the heavy rainfall, they should not be too troublesome in

...Directing Atlas



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ANDRES
SORIANO
President



GEORGE T.
SCHOLEY
Mining Engineer



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SMITH
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CLARENCE A.
WEEKLEY
Metallurgist



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DAN E.
LEWIS
Geologist



HENRY
SCHURING
Mill Sup't.



MANUEL M.
AYCARDO, JR.
Mining Engineer



AMADO B.
ARRIETA
Mine Supt.

the pit because of the fast runoff and the great predominance of hard ore. The washing plant installed as an integral part of the crushing plant will prevent packing and jamming of crushers by first washing this gouge out of the ore.

What is Toledo Ore Body?

The ore body is not a typical porphyry copper type. There is no intense alteration of the diorite stock. Mineralization is confined to fissure fillings, veinlets, and quartz stringers. However, while generally quite narrow, there are enough of these mineral filled fractures to make ore. They follow a definite pattern as explained below. Highest grade ore, and it is often twice as high as average, is located in a large mass near the center of the ore body. It is in this area that the Japanese concentrated their limited underground mining efforts during World War II. An inspection of Section VIII on the fold-out page illustrates these changes in grade within the ore body. Secondary enrichment is superficial.

The ore body has been proven by diamond drilling, both from the surface and underground, and by underground tunnelling to be shaped like a loaf of bread with the long axis trending southeast-northwest. Ore has been developed over a length of 1,500 feet, a width of 600 feet, and to a depth of 600 feet. Deeper drilling is underway to determine more about the deposit in depth. To date, nearly all of the deepest holes have bottomed in mineralization, much of it ore grade.

The hanging wall is formed by a strong series of faults which dip 40° north and strike N. 20° E. The diorite is mineralized above the fault, but is not ore grade. The footwall contact with pre-dioritic rocks dipping 60° east is not well defined. Copper content diminishes irregularly, and mining will be to an assay wall. To the northwest, the ore apparently is cut off by a fault. On the southeast, the ore extends under the river to the east side on which the mill is built.

Geologic History

The Pandan Series of sediments and amygdaloidal lava flows was intruded by diorite stocks. A series of N. 20° E. shears was developed in the stock. These shears are the controlling factor in the upward movement of the ore solutions, forming channel ways and eventually becoming mineral filled. Next, post-mineral faulting formed the present hanging wall fault series. Molybdenite content in a number of cores taken near this fault zones is higher than for the deposit

as a whole. Mineralization also follows a less well-developed series of N. 50° W. striking shears. Subsequently, the main N. 20° E. series was reopened and again mineralized. A series of cooling fractures, now filled with quartz and high-grade ore, developed along the footwall.

It is interesting to note that the faults—the footwall dipping 60°, and the hanging wall dipping 40°—both dip away from the apex, so that the favorable zone for mineralization in

Table No. 1

Operating Costs at Atlas Consolidated Mining and Development Corporation's Toledo Mine for June 1955

MINING ORE (DIRECT EXPENSE) PER TON**		
Breaking	0.142	
Loading	0.067	
Hauling	0.082	
	0.291	0.291
Labor	0.100	
Explosives	0.030	
Supplies	0.161	
	0.291	
WASTE STRIPPING***		
Breaking	0.099	
Loading	0.065	
Hauling	0.323	
	0.487	0.487
Labor	0.121	
Explosives	0.002	
Supplies	0.364	
	0.487	
MINING ORE (INDIRECT EXPENSE)		
Supervision, engineering		
mine office	0.102	
Temporary mine roads	0.017	
Depreciation on mine		
buildings and		
equipment	0.291	
Assaying	0.014	
Miscellaneous	0.074	
	0.498	0.498
Labor	0.111	
Explosives	0.033	
Others	0.354	
	0.498	
DEPLETION		
Labor	0.332	
Explosives	0.065	
Supplies	0.525	
Others	0.434	
		0.080
Total	1.356	
Total Mining		1.356
CRUSHING AND CONVEYING		
Labor	0.060	
Supplies	0.029	
Power	0.051	
Depreciation	0.040	
Others	0.011	
Total	0.191	
MILLING		
Labor	0.269	
Supplies	0.912	
Power	0.715	
Depreciation	0.126	
Others	0.045	
Total	2.067	
GRAND TOTAL	3.614	

* In Pesos with Pesos 1.0 = to \$0.50 U.S.A.
** 111,116 short tons of ore mined and milled.
*** 99,589 cubic yards of waste stripped.

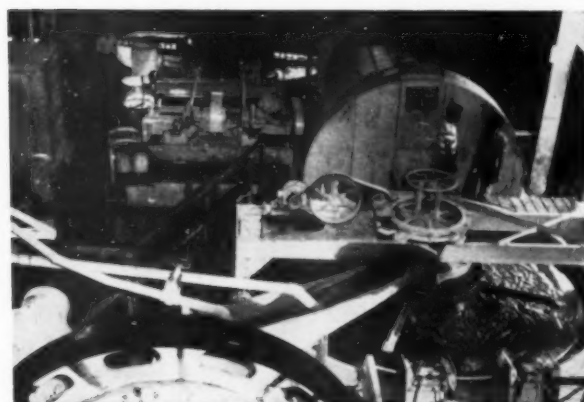
Continued on reverse side foldout page



GYRO-FLO COMPRESSORS mounted on surplus half tracks furnish all air for drilling in the pit. These self-powered units drive to the wagon drills so no air lines are needed.



KREBS CYCLONES make a separation following primary grinding. The sand fraction is reground; the undersize goes to scalper flotation to produce a copper concentrate.



BULK FLOTATION CONCENTRATE is reground in 6- by 12-foot Allis-Chalmers ball mill in closed circuit with Dorr bowl classifier before final chalcopryrite separation is made.



FAGERGREN-type Sumitomo Machinery Company flotation machines are used in the bulk concentrate circuit. There are four banks of these six-cell machines. Tailing is final mill tailing.

the diorite stock between the faults enlarges with depth.

How Atlas Increased Reserves

While copper has been known on Cebu for many years it was not until World War II that first substantial production was made, and this by the Japanese who developed an ore body, in the high-grade core mentioned above, which was 300 feet in length, 120 wide, and 100 deep. In 1951

Mindanao Mother Lode Mining Company secured the mine and reopened Japanese workings. In 1952 A. Soriano y Cia optioned the property following a favorable report by George T. Scholey, then the firm's mining engineer. Subsequently, he supervised all exploration and development which to date indicates 37,646,300 tons of proven and probable ore averaging 1.018 percent sulphide copper.

Table No. II

Summary of Positive and Probable Ore by Blocks at Atlas Consolidated Mining and Development Corporation's Atlas Copper Mine, Cebu, Philippine Islands

Block	Positive Ore Tons	Percent Copper	Probable Ore Tons	Percent Copper	Waste Stripping Tons to Minus-100-Foot Level	Tons Ore Available Open Pitting to Minus-100-Foot Level
III-IV	410,000	0.98	820,900	0.90	400,000	417,000
IV-V	928,100	0.92	890,000	0.90	667,000	692,000
V-VI	1,750,000	1.04	970,000	0.95	950,000	983,000
VI-VII	2,358,000	1.24	1,008,400	1.05	933,400	966,700
VII-VIII	2,500,000	1.27	1,266,700	1.03	767,000	1,133,400
VIII-IX	2,517,000	1.07	1,366,600	1.01	653,000	891,000
IX-X	2,684,000	1.02	1,200,000	0.96	720,000	816,000
X-XI	2,342,000	1.01	1,291,000	0.98	825,000	1,225,000
XI-XII	1,770,000	0.89	1,461,000	0.80	848,000	1,247,000
XII-XIII	1,670,000	0.84	1,463,000	0.80	867,000	1,240,000
XIII-XIV	1,750,000	0.95	1,250,000	0.95	725,000	1,268,000
XIV-XV	2,000,000	1.10	1,083,000	1.03	440,000	1,392,000
XV-XVI	1,967,000	1.09	1,042,000	1.02	375,000	1,419,000
XVI-XVII	1,800,000	0.99	975,000	0.94	318,000	736,000
XVII-50°W	—	—	683,000	0.80	320,000	—
III-50°E	—	—	—	—	110,000	—
TOTAL	26,466,300	1.05	16,770,600	0.94	9,918,400	14,426,100

This development work consisted of drilling and driving 2,018 feet in the ore; the cutting and assaying of several thousands of samples; and the mining and sampling of 5,240 tons of ore from exploration headings. All cut samples averaged 1.13 percent copper which checked the 1.14 average of all car samples taken from the underground work.

Further indication of grade was the assaying of 9,661 feet of diamond drill core. These averaged 1.01 percent copper. Gold content varies between 0.015 and 0.30 ounce per ton. About two-thirds of this is associated with the copper minerals.

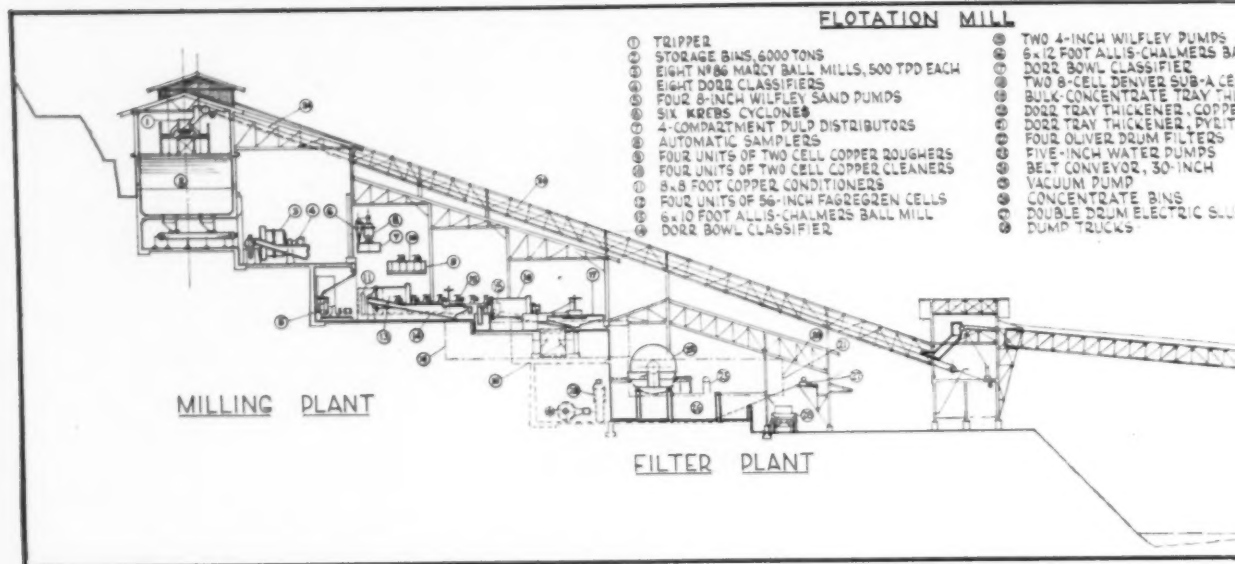
Following this exploration, tonnage, grade, pit outlines, and stripping ratios were obtained by preparing cross sections every 100 feet along the axis of the ore body. These sections are on a vertical plane striking N. 40° E.

See Table No. II for summary of these ore reserves by sections.

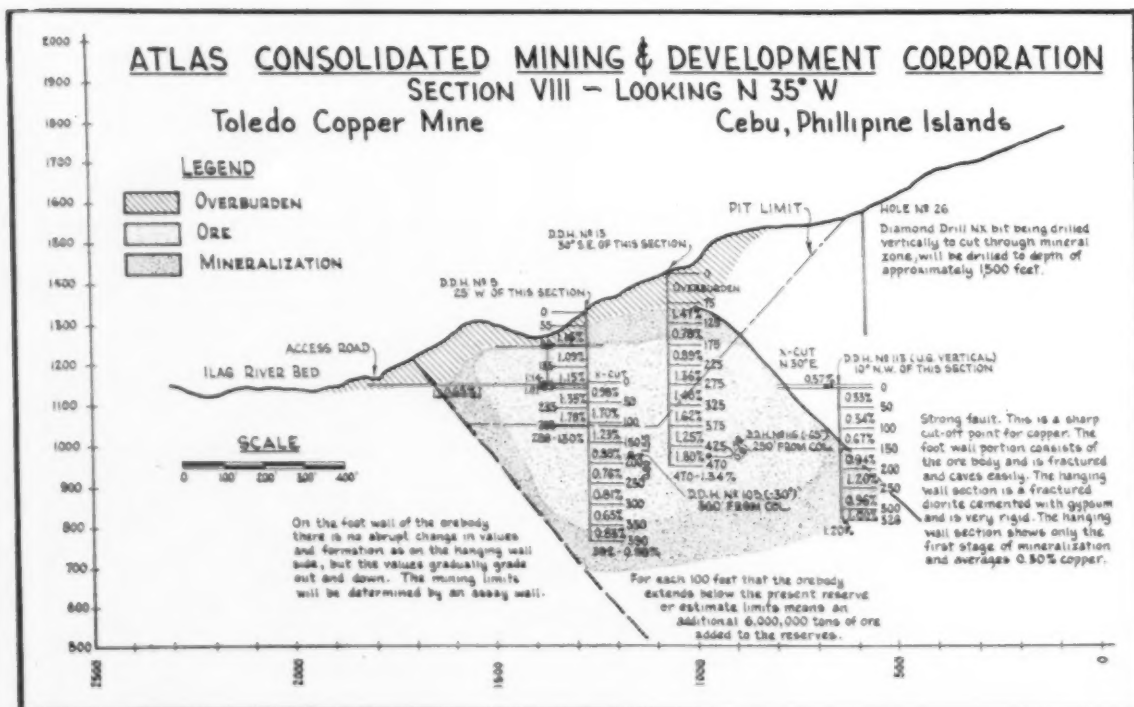
Waste stripping for mining to the minus-100-foot level (below Ilag River bed) with a 45° back-pit slope will be 9,918,400 tons. This is a ratio of 0.688-ton waste per 1.0 ton of ore.

Stripping to date has shown that several pinnacles of sulphide ore,

This Mill and This Mine Make Atlas the



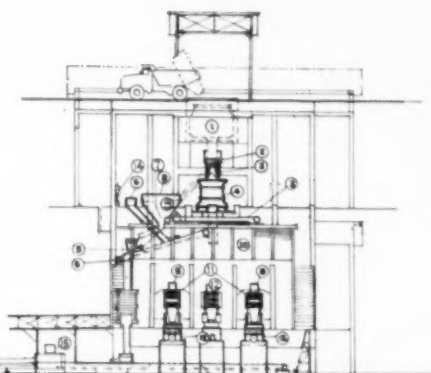
Atlas Uses a Unique Conveyor Belt System to Carry Fine Ore from Crushing Plant, at



Atlas Ore Body Has Been Well Prospected by Surface and Underground Diamond Drilling

PUMPS
 BERS BALL MILL
 2
 B-A CELLS
 RAY THICKENER
 , COPPER
 , PYRITE
 TERS
 MPS
 NCH
 IC SLENDER

- ① RECEIVING BIN, 200 TON
- ② APRON FEEDER, 48 INCH BY 16 FEET
- ③ LIVE ROLL GRIZZLY
- ④ GYRATORY CRUSHER
- ⑤ BELT CONVEYOR, 30-INCHES
- ⑥ BELT CONVEYOR, 24-INCHES
- ⑦ SCL SAND PUMP
- ⑧ DOOR WASHER
- ⑨ VIBRATING SCREEN, 4 x 8 FEET
- ⑩ SURGE BINS
- ⑪ VIBRATING SCREENS, 4 x 8 FEET
- ⑫ SYMONS CONE CRUSHER, 4 FEET
- ⑬ SYMONS CONE CRUSHER, 5 1/2 FEET
- ⑭ KREBS CYCLONE
- ⑮ WEIGHTMETER



CRUSHING PLANT

ATLAS CONSOLIDATED MINING & DEVELOPMENT CORPORATION	
ADDRESS 1111 10th Ave. S.W.	TOLSON PROJECT LUTHERAN CHURCH PHIL.
CITY TOLSON	6000 TONS
COUNTRY U.S.A.	COPPER MILL PLANT
APPROVAL C.A.W. REPLY	DATE JUL 19 1968

CONVEYOR

FEEDER CONVEYOR 24" V.S. SPEED REGULATORS

CONVEYOR

FINE ORE FROM CRUSHING PLANT

TAILING TO SETTLING POND

MIDDLING BACK TO DISTRIBUTOR

OVER FLOW WATER TO STORAGE

POWER FLOW WATER TO STORAGE

DORCO DUPLER DIAPHRAGM PUMPS

DORCO DIAPHRAGM PUMPS

LEGEND

1. TRIPPER
2. STORAGE BINS-6000 TONS
3. 8" DIAPHRAGM BALL MILLS-500T/HR EACH
4. 8" DORR CLASSIFIERS - 6' x 18'
5. 4-8" WILFLEY SAND PUMPS
6. KRIBS CYCLONES, MODEL D20
7. 4-COMPARTMENT PULP DISTRIBUTOR 9' DIA
8. AUTOMATIC SAMPLERS
9. 4-UNITS OF 2-CELL COPPER ROUGHERS
10. 1-UNIT OF 2-CELL COPPER CLEANERS
11. 8' x 8' CONDITIONERS
12. 4-FINGERGRIND UNITS-56" EACH CONSIST OF 1-CLEANER CELL; 2-CLEANER CELLS AND 3-ROUGHER CELLS
13. 6' x 10' ALLIS CHALMERS BALL MILL
14. 6' x 30' x 13" DIA DORR BOWL CLASSIFIER
15. 4" WILFLEY PUMPS
16. 6' x 12' ALLIS CHALMERS BALL MILL
17. 6' x 31' x 18" DIA DORR BOWL CLASSIFIER
18. 2-8' CELL UNIT DENVER "21" SUB A FLOAT
19. 60 x 12' (BULK CONCENTRATE) TRAY THICKENER
20. 50 x 12' DORR TRAY THICKENER (Cu)
21. 50 x 12' DORR TRAY THICKENER (Fe)
22. 4-18" x 18" OLIVER DRUM FILTERS
23. 8" WATER PUMPS

ATLAS CONSOLIDATED MINING & DEVELOPMENT CORPORATION

DESIGN	J. T. M.	4000-TON (MILLING PLANT)
TRACED		
CHECKED	E. A.	
DESIGNED	C. D. W.	
APPROVED	C. A. WEEKLEY	

TOLEDO MILL FLOW SHEET

TOLEDO PROJECT

LUTOPAN, CEBU, PHILIPPINES

Cu. CONCENTRATES 70% TO 85% Cu.

Fe. CONCENTRATES 40% TO 50% D.

COPPER CONCENTRATE TO STORAGE AND LOADING AT SARGI BEACH

PYRITE CONCENTRATE

Atlas Flowsheet Eliminates Gangue at Coarse Size Before Regrinding Bulk Concentrate

originally calculated as oxidized waste, extend into the estimated stripping zone. This means an increase in ore reserves and a decrease in stripping ratio. Actually, it should be practical to mine to a steeper back-pit line than 45° by using proper berms, so the pit can be carried deeper than the minus-100-foot level.

Stripping Methods

Waste stripping started in July 1954 on the highest, 360-foot bench, at the southeast end of the ore body. Waste removed by Caterpillar D8's pulling 20-cubic-yard Carryalls was hauled southeast and dumped along the mountain side. By this means, 321,439 cubic yards were stripped in 1954. Overburden, largely oxidized diorite, varies from a few to over a hundred feet in depth.

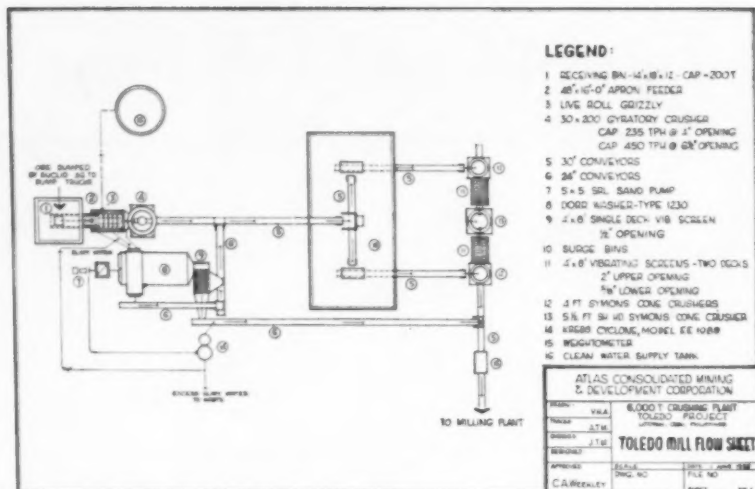
Stripping was stepped up early in 1955 following delivery of three two-cubic-yard, A-20-J Lorain shovels and four 22-ton, TD Euclid end dump trucks. The shovels are powered by Caterpillar D 337 and D 13000 Diesel engines and the Euclids by 300-horsepower Cummins Diesels. One shovel—and sometimes two—has been available for stripping, with one shovel continuously in ore after the mill started. Stripping of intermediary levels (below 360) has all been done with shovels and trucks. Caterpillar D8's with angle blades build initial bench roads, waste disposal roads, and clean up around the shovels.

Why Load with Small Shovels

Two-yard shovels are small for an open pit as big as Atlas. However, three small shovels are preferred to one large shovel because of the variations in ore grade in different sections of the pit. The operational plan calls for milling ore just over 1.0 percent copper. To obtain this grade with one large shovel would require several long moves per shift. By using two and three smaller shovels each shovel can load continuously in separate grade zones for a full shift. Thus, ore reaching the mill is blended to desired grade. The Euclid trucks, initially used for waste stripping, will be used for hauling from the higher and more distant benches. The lower benches, where mining first started, are close to the crushing plant so ore is hauled by two International Model B2-205 trucks (7-ton loads) and two Mitsubishi Fuso Diesel Model W11-DB5 trucks (13-ton loads).

Coyote Holes, Wagon Drills

It is planned to break much of the ore with Coyote hole blasts. With low wages and skilled Igorot minors, 40-foot-long holes with double T's



CRUSHING AND WASHING PLANT plan as it looks after expansion to a 6,000-ton-per-day capacity. Washing plant can be bypassed when hard dry ore is being mined. Two-stage Krebs cyclone recovers fine ore in washing circuit.

can be driven only 24 inches in diameter. Rock conditions determine hole spacing.

For both secondary drilling and for wagon drilling of either toe or vertical down holes, pneumatic drills are used. Air for these drills is supplied by two 600-cubic-foot, Ingersoll-Rand GyraFlo compressors mounted on crawlers. This gives a complete self-moving, self-powered air supply unit.

An Eimco 104 Caterpillar mounted loader is used for clean up loading on the benches and for loading out small pockets of oxidized material.

Two-Stage Crushing

The crushing plant is located on the same side of the Ilag River (north-west) as the open-pit mine. The mill is on the opposite side of the river.

Crushed ore is carried across the river and elevated to mill bins by a long belt conveyor. (See crusher-mill elevation on fold-out page.)

The crushing plant incorporates a Dorr washer ahead of secondary crushing to facilitate handling of wet sticky ore during the tropical rain season. When ore is dry, the washing plant is bypassed. When ore is sticky, the primary (live roll) grizzly undersize is washed; the muddy wash water is thickened by a Krebs Model EE 10 B9 cyclone with spigot underflow joining the fine ore. The washed oversize goes to secondary crushing.

Primary crusher undersize is conveyed to surge bins and is split to one of two four-foot Symons cone crushers. Crusher discharge falls to the top deck (2-inch openings) of a
(Continued on page 99)



ATLAS CONCENTRATE is shipped to Japan and smelted at Naoshima. This is an aerial view of Mitsubishi Metal Mining Company's copper-zinc smelter on an island in the Inland Sea. Naoshima is the most modern copper smelter in Japan.



DENSE JUNGLE must be cleared before open pit mining can be started. In this area high grade placer float was found.



Palawan— A Major Mercury Mine



GEORGE NEWMAN, vice president and general manager of Palawan Quicksilver points to high grade cinnabar in test pit.

Palawan Quicksilver Mines, Inc. had two of the most unusual problems ever to confront a mining company anywhere. They were (1) how to get into production fast enough, and (2) how to treat ore fast enough. All this means that Palawan is an unusual mine, and it is, too. Whereas most mines have a major problem in finding ore, Palawan doesn't—and hasn't since systematic prospecting and development was started in 1953.

First furnacing of ore started last month. The company had done everything possible to overcome many difficulties in order to start production so soon. The new Gould kiln was ordered in December 1954 in San Francisco. It was built as fast as possible, shipped as deck cargo to Manila (after delays in getting a ship to handle the long kiln sections), unloaded in Manila, reloaded to an inter-island ship for transportation to Puerto Princesa, unloaded there from ship to truck, hauled 14 kilometers to the mine at Tagburos, and erected on the already prepared foundation. Despite this fast schedule against adverse conditions the price of mercury had dropped from \$320.00 to \$255.00 per flask during this time.

The problem of treating ore fast enough can only be solved by addition of a second kiln which is being considered. The first one is working very satisfactory and was engineered

to handle abnormally wet and sticky ore during the rainy season.

Here's why treating of ore fast enough with only one kiln furnacing 125 to 150 tons per day of ore is a problem. As of June 1, 1955 ore reserves were 135,000 short tons assaying 7.55 pounds of mercury per ton. This was a great improvement in tonnage and grade from August 1, 1954 when reserves were only 77,000 tons assaying 6.38 pounds.

Found, Forgotten, Remembered

It was in 1937, that George Newman, now vice president and general manager of Palawan Quicksilver recognized cinnabar in a road cut in Tagburos Barrio, some 14 kilometers north of the city of Puerto Princesa. He was prospecting for gold and thought nothing of the cinnabar at that time. In 1953 he was again in the area and because of the high price for mercury decided to recheck his mercury discovery. By careful prospecting and stream panning in the heavy tropical rain forest he was able to locate botryoidal cinnabar on outcrops. Once the form and nature of the outcrops had been determined many additional outcrops of mercury were found in the area as the prospectors knew what to look for.

Prospecting has continued in the area and three kilometers away cinnabar has been found in stringers in

metamorphic schistose argillite. Test pitting is under way and high-grade stringers to ½-inch thick of cinnabar have been found.

To date this prospecting has shown six mineralized areas in one square mile. One acre has been proved to contain ore grade material in the weathered zone similar to the first discovery. Prospecting in the dense bamboo grooves and rain forest has been by following river and creek beds and panning the gravel.

The pit is planned so that six or seven faces of ore will be exposed. During the wet season the ore will be mixed with that from underground to assure a suitable furnace feed. No trouble is expected in operating the pit in rainy season as the area drains well. The surface material will get wet but is relatively gritty because of high silica content and does not make mud. Rainfall extends over a seven-month period and averages 75 inches per year. There is an almost daily shower with no typhoons.

Mining will be both open pit and underground. A ¾-yard Buckeye shovel will start mining near the top of a low ridge.

Palawan is a most important mine. Its discovery proved that prospecting opportunities still abound in the Philippines. Palawan is a new mine, and, most important, Palawan is a new mining district.



MASARA'S NEW MILL is shown in the picture above during early construction. This is the southernmost mine in the Philippines and is located in a tropical rain forest as shown in the picture.

Masara copper-gold-silver-lead-zinc ore bodies are in steep dipping veins in andesite. The mine has been developed through five adits. Portal of lowest (0 Level) is shown in the picture at left.

Where Will The New Mines Be Developed In The Philippines?



In addition, Elizade controls the Masara Mining Company and the Sibalay Copper Mining Company whose operations and prospecting activities are described below.

Other active exploration companies are the Mindanao Mother Lode Mines, Inc., Atlas Consolidated Mining and Development Corporation (Mati iron project), Philex Mining Corporation, and Baguio Gold Mining Company.

Sibalay—Open Pit Copper?

The most important development program now underway in the Philippines may lead to the Island's second open-pit copper mine. It is that of the Sibalay Copper Mining Company which is owned as follows: Elizalde and Company, Inc. 60 percent; Mitsui Metal Mining Company, 32 percent; and Nanyo Bussan K. K. 8 percent.

The 231 mining claims of the company are located in western Negros in an area of craggy hills with heights from 100 to 200 meters above sea level and only eight kilometers from Panay Gulf. The Sibalay River crosses the area flowing westward.

Five main mineralized areas have been located at Baclao, Cansibit, Canmany Creek, Alberto, and Binulig Ridge. The latter has been most intensely prospected and shows the best economic possibilities. Here along a zone between metavolcanic rocks and an intrusive quartz diorite, a porphyry-type ore body may justify large-scale development and mining. Primary sulphides—chalcopryrite and pyrite—have been found in place only in drill cores. However, near the surface these minerals have been dissolved by ground water and precipitated in the quartz diorite largely as the copper silicate chrysocolla, to-

What new mines are being equipped for production in the Philippine Islands?? What exploration projects are under way which, if successful, will result in new mines?? What are the companies most actively engaged in exploration??

The one company whose operations best answer these questions is Elizalde & Company, Inc. with headquarters in Manila. This company's mining department, under the supervision of J. P. Cabarrus, vice president; E. Biel, technical advisor; and C. T. Sison, geologist, now manages the important producing iron ore mines of the Samar Mining Company, Inc., and Marinduque Iron Mines Agents, Inc.

Watch Samar Discovery

The Samar copper discovery mentioned on page 64 is important. Last minute report from the Islands is that diamond drilling has started. Iron ore overlying the copper bearing shale contains up to 1.5 percent copper. In four areas reserves are estimated at over 3,000,000 tons of 54 percent iron. One deposit has 1.2 percent copper. Watch for full details in October MINING WORLD.

gether with subordinate malachite. The leached zone is very thin—to five meters thick—so waste stripping would be negligible. One diamond drill hole has shown mineralization to extend at least 50 meters below the river bed. Gold, silver, and molybdenum mineralization is associated with the copper.

In 1947 Kennecott Copper Corporation sent a mining engineer to investigate the deposit. Kennecott later started negotiations for the deposit but these were never completed.

In November 1953, the present company was formed, and large-scale geologic mapping and exploration were started. The Philippine Bureau of Mines and the United States Geologic Survey aided in mapping of the area. The Sipalay company has completed 1,165 meters of diamond drilling, 9,963 meters of surface contour trenching, and taken over 2,300 samples. Mitsui's chief geologist, C. Nishiwaki, and a group of Japanese geologists recently spent several weeks making a final appraisal of the property.

Reserves of about 10,000,000 tons of 0.80 to 1.00 percent copper have been developed in the Binulig Ridge deposit. There is a possibility of developing and mining several areas by open pitting. All drilling results to date indicate that selective mining will be necessary.

Elizalde will manage the mining and concentration operations when the property is brought into production. It will necessitate harbor facilities, a power plant, open-pit mining, and a major concentrator. Initial thinking has been in the 3,000 to 4,000 ton per day range. Copper concentrates will be smelted in Japan by Mitsui.

Mindanao Lode Develops

In September 1953 Mindanao Mother Lode Mines, Inc. mined the last pound of ore and closed its gold



MINDANAO MOTHER LODGE is developing a copper-gold property in western Luzon. The portal of the new cross cut adit is shown at left with the mine office and thatched compressor house at right. Mahogany mine timber is cut in local jungles.

mine in the Surigao district. An active exploration program has been carried out by the company since that time to try to find a prospect which might be developed into a mine. Mindanao is fortunate in having all necessary mine equipment, a 400-ton-per-day flotation mill, and a Diesel electric power plant.

After checking and rejecting many prospects in the Islands, an exploration party headed by L. E. Smith, on May 27, 1954, climbed the south slope of Mt. Batalan, Cabangan, Zambales and came upon the outcrop of a quartz-chalcopyrite-limonite vein in a dry creek bed. Maximum width was 40 feet but the average much less. Length was about 400 feet. This was a good prospect so a diamond drill was moved onto the property in July and 41 holes drilled. This drilling showed mineralization in a shear zone in serpentine and gabbro. The best section is 445

feet long with widths to 20 feet. Indicated grade is 3.5 percent copper. The mine is now being developed through a 700-foot-long cross cut adit to the vein with drifting along the vein. John Curtis, manager, supervises mine development.

Masara's New Mill

Masara Mining Company has completed the newest mill in the Philippines. It is a 250-ton-per-day selective flotation and cyanide plant designed by the Denver Equipment Company following metallurgical test work. Masara is almost due east of Davao City, Mindanao and is reached by a good 100-kilometer-long automobile road. The company built and maintains the last 28 kilometer section.

Masara is the mine initially developed by Panaminas, Inc. following World War II. When Panaminas terminated its exploration program, the



J. CABARRUS
Vice President
Elizalde and Company, Inc.



PAUL SCHAEFFER
Vice President
Philex Mining Corporation



J. C. CURTIS
Manager
Mindanao Mother Lode Mines, Inc.



AIRPLANES SPEED MINE DEVELOPMENT in the Philippines. This Twin Beech is owned by Elizalde and Company, Inc. and used to fly key personnel between operations. E. Biel (left), Elizalde's technical consultant, and George Scholey, manager, Philex Exploration Corporation, are ready to fly to Mindanao.

Masara owners continued underground development. The two companies developed 200,000 tons of ore in a sheeted vein system in andesite. The vein averages six feet in width and is surprisingly similar to a number of veins in Colorado's San Juan Mountains. Ore averages 0.35 ounce gold, 2.36 ounces silver, 0.76 percent copper, 0.74 percent lead, and 1.3 percent zinc per ton.

The mine is developed through five adits 100 feet apart. The lowermost (0 level) is at mill level. Two ore shoots have been developed with good grade ore extending below the 0 Level. Underground exploration is continuing laterally (to the southeast) to check mineralization found by surface diamond drilling.

The mill, built by Masara on a side hill 2,000 feet from the 0 Level portal, uses the 3-foot Traylor gyratory crusher, 3-foot Symons cone crusher, and the Traylor 86 ball mill from the nearby prewar mill of the Davao Gold Mining Company.

Baguio Gold Prospects

The Baguio Gold Mining Company has been carrying on a limited geological search for new mines; preferably base metals. Copper prospects in northern Luzon, and uranium-iron occurrences south of the Philippine Iron Mines in Camarines Norte have been investigated. The search is continuing.

Atlas' Mati Iron Project

Atlas Consolidated Mining and Development Corporation has developed high-grade hematite-magnetite iron

ore bodies in southeastern Mindanao. They are contact metamorphic type between metamorphosed sediments (marbilized limestone) and a diorite intrusion. Average iron content is 60 percent with reserves of positive and probable ore of 2,500,000 tons. In June, Atlas and Mitsubishi Metal Mining Company, Ltd. signed a contract whereby Atlas would mine the ore and Mitsubishi would advance funds against future ore shipments to place the mine in operation. The contract calls for shipment of a minimum of 180,000 annual tons for a five-year period. Atlas crews have recently completed a major road construction project from the shipping port to the mine and are building a

crushing and screening plant. Mining will be by open pitting.

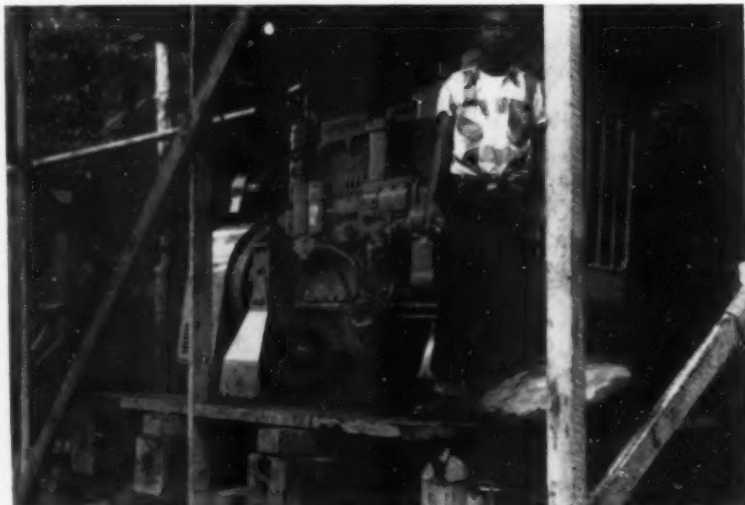
New Discoveries In Samar

The possibility of a new copper district in central Samar electrified the Philippines in mid-August. It is near Bagacay and was discovered by geologists of the Marinduque Iron Mines, Agents, Inc. Appreciable copper values have been found in a carbonaceous shale underlying iron ore deposits. This area is 55 kilometers from an ocean port near San Julian. The geologists discovered the copper cropping out over a 50-meter length while prospecting for iron in early April. By mid-July conservative estimates were that some 20,000 tons of a secondarily enriched shipping grade copper ore had been developed with good possibilities of increasing this tonnage.

Philex Seeks Mines

The newest exploration company in the Islands and one which has made an active start, backed by the combined experiences covering many years of geologic work by its officers, is Philex Mining Corporation. Philex is specializing in the acquisition of prospects with the purpose of developing them to the point where they can be offered to other financial interests, financed by the organization of new companies, or developed and operated by Philex.

Officers of Philex are Henry Brimo, president; Paul Schaefer, vice president and general manager; and George Scholey, general manager and chief engineer. The firm is actively investigating copper and copper-gold properties at the present time.



CATERPILLAR DIESEL ELECTRIC generation set was used by Masara to furnish mill camp lighting and limited power to operate welding machines and other tools during construction of the new 250-ton-per-day flotation-cyanide mill.



HUMPHREYS SPIRALS upgrade chromite ore at Acoje Mining Company's gravity mill. Spiral feed is plus-80-mesh sand. Slime is treated on Deister diagonal deck tables. Acoje mill feed averages 24 percent Cr_2O_3 and concentrate 49 percent.

L. W. SHANER, mine superintendent, has made Acoje one of the most efficient operations in the Philippine Islands.

L. E. CHARLOT, general superintendent, supervised railroad construction which reduced shipping costs from 3.8 to 1.0 pesos per ton.



BENGUET MINES refractory grade chromite by open pitting at its Consolidated Mines contract. The ore body is intruded by a series of gabbro and diorite dikes which make clean mining difficult. Production averages 2,500 tons daily.



Chromite Importance Will Grow With New Discoveries and Two Big Mines

With the largest refractory grade chromite mine in the world, with one of the most important metallurgical grade chromite mines, and with new discoveries of high grade ore the Philippines are and will continue as an important chromite mining center.

The largest refractory grade mine is the Coti mine of Consolidated Mines, Inc., operated by Benguet Consolidated Mining Company; the outstanding metallurgical grade mines are those of Acoje Mining Company. Both are in Zambales in western Luzon. They are only five minutes apart by airplane but three hours by automobile. Fortunately, both are less than 25 kilometers from deep water ports on the China Sea. Careful prospecting in the known chromite districts is continually disclosing unknown ore bodies. More important, new districts are also being found. A typical example of the latter is the central Palawan district where diamond drilling has shown fair tonnage of 59.5 percent Cr_2O_3 with a chrome to iron ratio of 3.45. Total

Philippine reserves are unknown. However, they are known to be large and can be increased by just plain digging.

Consolidated operates a 2,500 tons per day open-pit mine and HMS plant. Clean mining is impossible, because gabbro and diorite dikes cut the ore body. The HMS plant, using two Akins separators and a ferrosilicon medium with a 3.104 density, rejects 40 percent of the feed. Consolidated has shipped more than 2,500,000

metric tons of concentrate since the end of World War II, most of it to refractory companies in the United States and with important shipments to the federal government's stockpile. A lowering of minimum shipping size in the specifications from plus-22-inches to the present shipments where 80 percent is plus-10-mesh has been an important factor in selling concentrate.

All mining at Acoje is underground with most production from top slice stopes. Mill feed comes from different and widely separated mineralized zones, so, in effect, a custom milling operation is necessary. Some ore mineral is liberated at 10-mesh; other ore must be ground to 48-mesh.

Straight gravity concentration following rod mill grinding is used. Sand, plus-80-mesh, is treated in Humphreys spirals and the slime fraction on Deister diagonal deck tables. Mill feed ranges between 20 and 27 percent Cr_2O_3 . Recovery averages 80 percent in a concentrate assaying 49 percent Cr_2O_3 with a chrome to iron ratio of 2.4 to 1.0.

Metallurgical testing is under way (with initially favorable results) to recover the minus-270-mesh chromite by cyclone and to upgrade concentrate by elimination of ferruginous minerals by dry high tensile electric separation.





Since the end of World War II, the iron mines of the Philippine Islands have been the largest source of iron ore for the Japanese steel mills.

The largest single supplier of ore has been the Philippine Iron Mines, Inc., which operates a large mechanized open-pit mine, several smaller pits, and an underground mine at Laoag on the east central coast of Luzon. From 1948 through 1954 shipments totaled 3,498,490 metric tons of ore. Shipments in 1955 have averaged nearly 90,000 tons per month, with an all-time monthly high in May of 109,645 tons. This ore averages 57 percent iron but is high in sulphur, some of it up to 1.0 percent. With the largest ore reserves in the footwall section of the mine and with much of this ore higher in sulphur than shipping specifications permit sulphur has been a constant problem.

Fortunately, test work has shown that a large part of this sulphur, largely occurring in pyrite, can be removed by beneficiation. Because the ore bodies are cut by a series of steeply dipping most mineral cross faults, clean mining has been very difficult, particularly so with large shovels. Therefore, waste dilution has been another problem. Test work proved that the same beneficiation plant that will reduce the sulphur will also eliminate most of the non-ferrous constituents of the ore by various mechanical means.

Five-Year Contract

Late in 1954 H. I. Belden, president, and O. V. Boni, vice president of Philippine Iron Mines, completed final arrangements and signed a contract with three Japanese steel mills for the sale of 6,000,000 tons of iron ore in the next five years. As part of the contract the Japanese are advancing \$2,000,000 for erection of a 6,000-ton-per-day beneficiation plant which will reduce both the sulphur and gangue content of the ore.



OPEN PIT MINING CONTRAST in the No. 2 pit of Philippine Iron Mines, Inc. Marion 93M and 43M shovels load 10-yard Diamond T trucks while nearby natives hand-load high grade ore. This means clean ore in the dike layered and faulted ore body.

Philippine Iron Mines Expands Underground

Immediately upon the signing of the contract, A. Soriano y Cia., consulting engineers for Philippine Iron Mines, together with the staff of Atlantic Gulf and Pacific Company, general managers of the PIM, started to design the new plant. They will also do all purchasing and construction, so as to permit the mine operating staff to devote all energies to maintaining regular production. C. A. Weekley, metallurgist for A. Soriano y Cia., has supervised all design.

Ore Beneficiation Results

Test work and pilot plant operation showed that treatment of the magnetite ores presents no serious problems. Where dilution is caused by cross cutting diorite dikes, a good separation of magnetite and diorite can be made magnetically and at a coarse size. Where the ore is an intergrowth of coarse grained magnetite and gangue, crushing is necessary for mineral liberation. After crushing, all the magnetite fines, minus- $\frac{3}{16}$ -inch, will be pumped to the sinter plant where separation will be readily made by wet-type magnetic separators.

Beneficiation of the hematite-limonite ores is a more difficult prob-

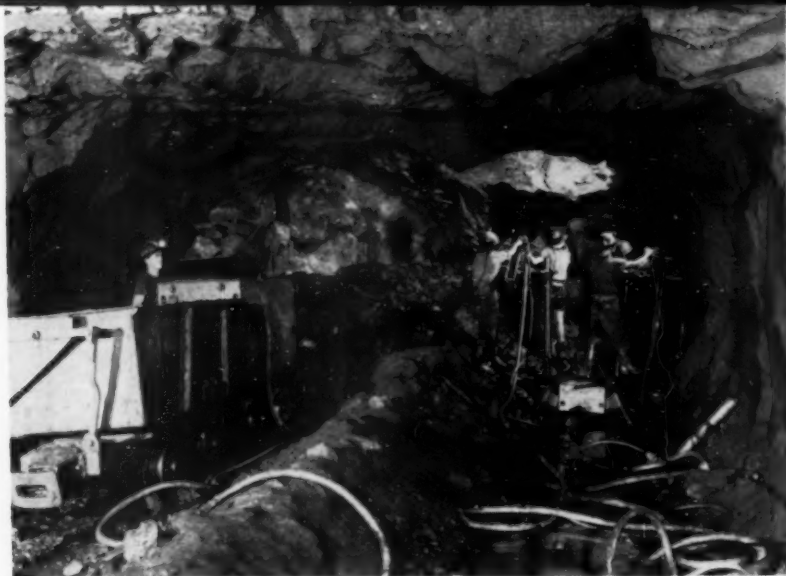
lem. Fortunately this type of ore constitutes only a small part of the total tonnage to be treated. The fine clay minerals will be eliminated in the spiral classifier overflow, but unfortunately some fine ore particles will overflow too.

Coarse waste will be easily rejected on the picking belts, over which all types of ores, except high sulphur, will pass. Unavoidably, some pea and nut size waste will go into the hematite lump ore. Also fine waste will be in the fine sand feed to the sinter plant. Further testing is planned for the recovery of this material. (Mr. Weekley recently completed an inspection trip of iron ore beneficiation plants on Minnesota's Mesabi Range to observe ore dressing practices on fine-sized, iron-bearing materials—Ed.)

Plan New Beneficiation Plant

The beneficiation plant, as initially planned, will be divided essentially into at least four different sections (see plans and elevations).

1) *Underground crushing plant* at the Superior shaft: This entails the installation of a new steel headframe several feet higher than the present wooden one, receiving bins for ore and



UNDERGROUND MINING of the hanging wall ore body is by sub-level stoping. This picture shows natives operating the latest mechanical equipment. Development is now underway on a new level 400 feet above sea level and 150 feet below stopes.



URANIUM is checked by Jack Frost, geologist. Mining has developed a copper-uranium-molybdenum area.

To Build Beneficiation Plant; Mining and Develops Uranium

waste, and a heavy-duty apron feeder ahead of a large 42-by 30-inch jaw crusher. The crushed ore will be conveyed to the main beneficiation plant.

2) *Main crushing plant:* This will consist of three distinct crushing units for pit low-sulphur magnetite ores, pit high-sulphur magnetite ores, and purchased and surface-mined hematite and limonite ores. Each type of ore will be conveyed to its respective surge bin after crushing, then each, in turn, to a series of bins in the main beneficiation plant.

3) *The Main Beneficiation plant* will have four separate sections, each with its own storage conveying, scrubbing, and treatment equipment for (a) hematite-limonite ores, (b) clean pit and underground ores, (c) mixed pit ores and underground ores, and (d) high sulphur and sinter plant feed.

In the (a) section, hematite ore will be crushed, scrubbed, and the clays eliminated. The minus- $\frac{3}{16}$ -inch material will join the sinter product if it is sufficiently high in iron.

The (b) section ores will be crushed to minus-2-inches, scrubbed, screened, and either sent directly to lump ore storage,

or to the magnetic separation plant. The minus- $\frac{3}{16}$ -inch fines will go to sinter feed.

In the (c) section, mixed magnetite ores will be crushed to minus-2-inches, scrubbed, and screened. The fines will be removed and sent to the sinter feed and the balance treated by magnetic separation to remove the gangue and some sulphur.

The (d) section will treat high sulphur ores. All the ore in this section will be crushed to minus- $\frac{1}{2}$ -inch so as to meet the requirements of the Japanese steel mills. The relatively fine crushing will also liberate some of the pyrite which will be rejected by the magnetic separators.

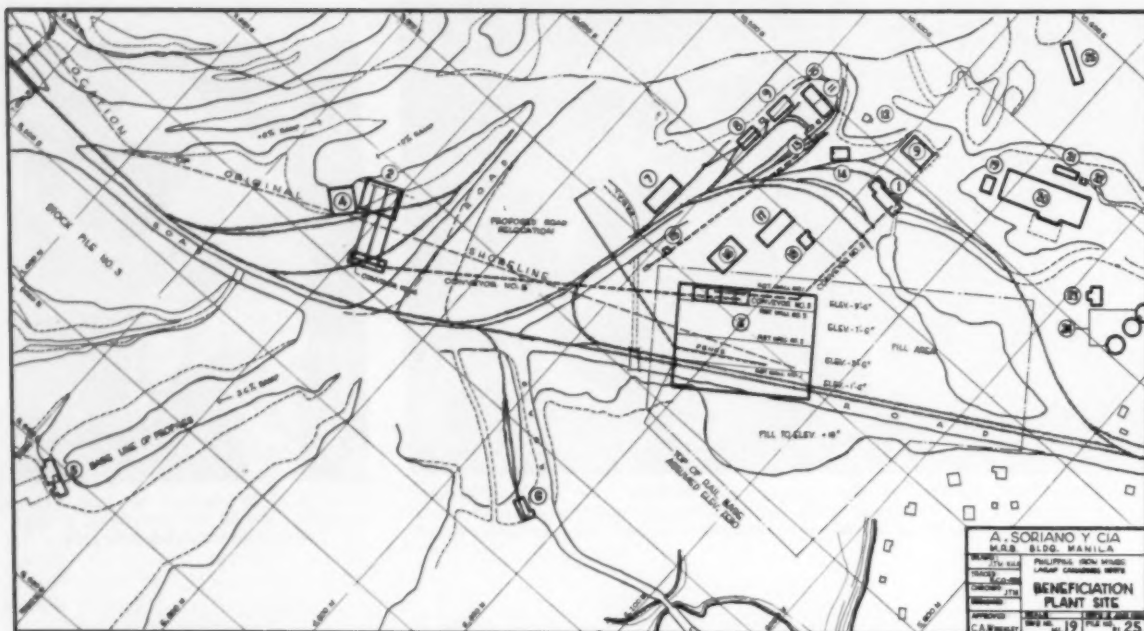
Two types of separators will be used: a wet type for the minus-8-mesh material, and a dry drum type for the plus-8-mesh, minus- $\frac{1}{2}$ -inch material.

4) *Ore storage area:* The direct shipping lump ore will be conveyed to an outside, open blending, storage area where up to 100,000 tons can be stored. A belt conveyor reclaiming system will be provided to recover the ore and place it in loading bins, from which several cars can be loaded at one time. By the use of a stockpile,

much time can be saved during inclement weather when the open-pit and underground production of necessity is curtailed. The sinter product will also be stored in a way to facilitate outloading at a rapid rate.

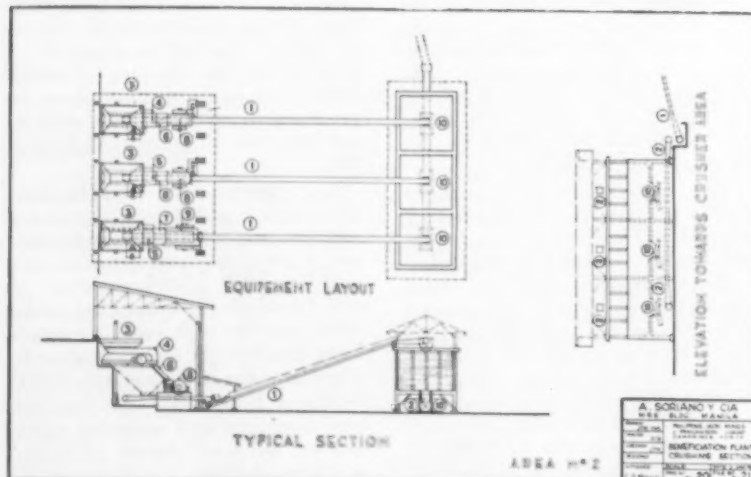
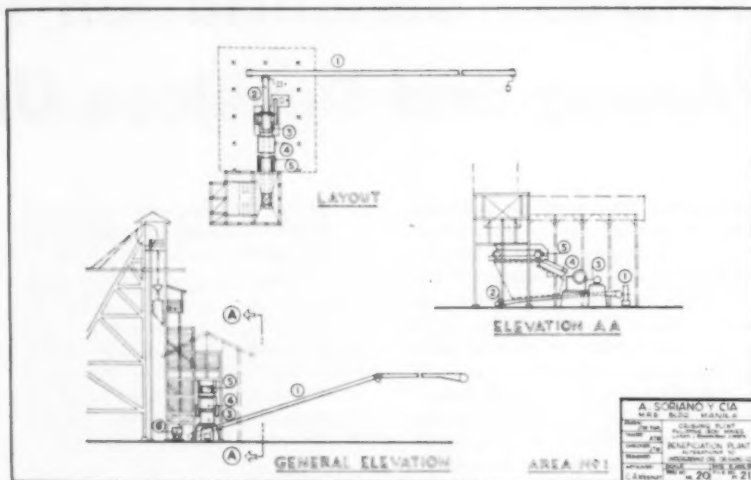
The lump shipping ore from the new plant will all be minus-2-inches in size with all the minus- $\frac{3}{16}$ -inch material removed. All waste will be rejected, as well as some of the sulphur and copper minerals. For Japanese steel furnaces, it will be an ideal feed; in fact, the 850,000 tons to be shipped per year will bring a premium price under the shipping schedule. Anticipated grade will be about 60 percent iron, 0.60 percent sulphur, and less than 10 percent Al_2O_3 plus SiO_2 .

In addition to the main beneficiation plant the following equipment additions and mine development programs are under way: purchase and installation of 2,500-horsepower of new Diesel-electric generation equipment, together with necessary power lines, transformers, and switchboards, a new large pumping plant with 12,000 meters of 8-inch pipe line; two surface scrubbing and screening plants to treat old mine dumps (stripping) and talus deposits. Underground im-



PLANT SITE

- (1) Area No. 1 crushing section (under-ground ore).
- (2) Area No. 2 crushing section.
- (3) Area No. 3 main mill section.
- (4) Ore bin.
- (5) Existing sinter plant.
- (6) Crusher.
- (7) V. A. bodega.
- (8) Timber framing shop.
- (9) Hoist house.
- (10) Drill sharpener shop.
- (11) Bodega.
- (12) Transformer house.
- (13) Bussar shaft.
- (14) Electrical tool house.
- (15) Pump.
- (16) Change house.
- (17) Lamp house.
- (18) Office.
- (19) Air receiver.
- (20) Power house.
- (21) Water tank.
- (22) Oil tank.
- (23) Residential area.
- (24) Water tank.
- (25) Water cooler.

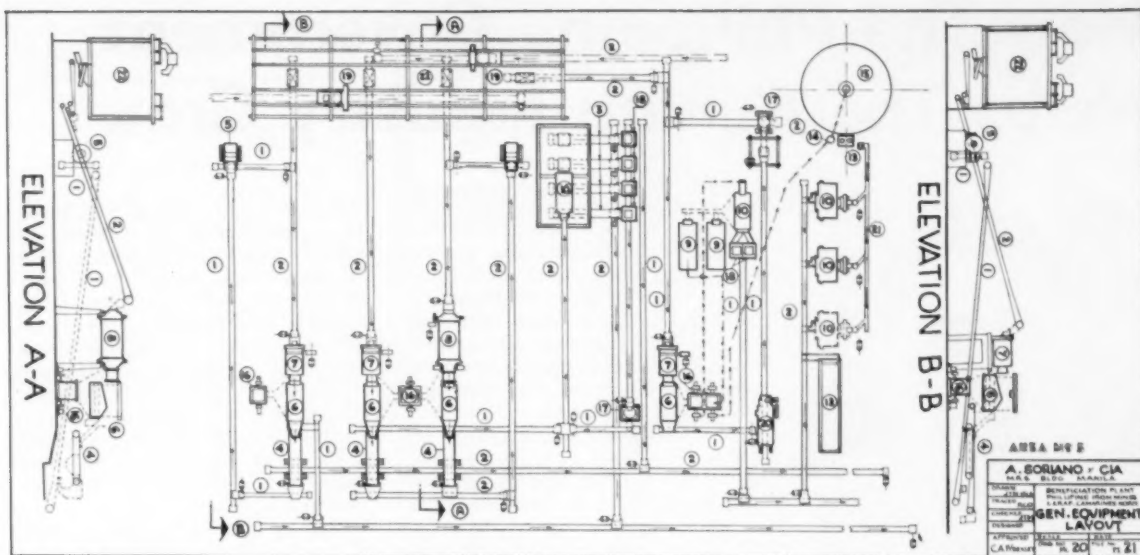


AREA NO. 1

- (1) 24" belt conveyor.
- (2) 30" belt conveyor.
- (3) 30" by 42" Pioneer jaw crusher.
- (4) Roll grizzly.
- (5) 48" by 16' apron feeder.
- (6) Mine car.

AREA NO. 2

- (1) 24" belt conveyor.
- (2) 30" belt conveyor.
- (3) Dump hopper.
- (4) 32" by 15' Apron Feeder, 75 hp.
- (5) 48" by 15' Apron Feeder, 75 hp.
- (6) Bar grizzly.
- (7) Roll grizzly.
- (8) 18" by 30" jaw crusher.
- (9) 30" by 42" jaw crusher.
- (10) Vibra-Flow feeder.



AREA NO. 3

- (1) 18" belt conveyor.
- (2) 24" belt conveyor.
- (3) 36" belt conveyor.
- (4) 48" picking belt.
- (5) 50 hp. jaw crusher.
- (6) 5' by 12' 3-deck screen.

- (7) 40 hp. scrubber.
- (8) 7' by 15' blade mill 100 hp.
- (9) 40" by 4' Crockett separator.
- (10) 5' by 12' Single-deck screen.
- (11) Dorrco filters.
- (12) Dewatering classifier.
- (13) Dorrco pumps.
- (14) Cyclone.

- (15) Tray thickener.
- (16) Sump.
- (17) Hydro-Cone fine crusher.
- (18) 30" magnetic drum separator.
- (19) Tripper.
- (20) 54" by 24" roll crusher, 100 hp.
- (21) Laundry.
- (22) Ore bin.

provements will include the sinking of both the supply and ore hoisting shafts to the 450-foot level, installation of skip pockets, and general improvements in the underground haulage and skip loading systems.

Uranium In Footwall Beds

Late in 1954, Jack Frost, chief geologist for Philippine Iron Mines, and George Scholey, then mining engineer for A. Soriano y Cia, made a radiometric survey of the mine area. During this survey, radioactivity was discovered in the so-called low-grade area in the footwall south of the main iron deposits. As the area had been diamond drilled previously, a Geiger counter test was made immediately on all drill cores. Radioactivity was found in several sections of cores from a number of holes. Extensive laboratory testing proved the source to be uranium—and incidentally, the first Philippine discovery of ore-grade uranium.

Carefully planned and geologically directed diamond drilling and underground exploration in the area has since indicated 150,000 tons of mineralized rock assaying 1.3 percent copper, 0.4 percent molybdenum, and 0.03 percent U_3O_8 in mineable thicknesses. By halving the tonnage, the grade could be doubled. There is

every possibility of increasing the tonnage to 500,000 by deeper underground crosscutting and drifting. What the grade of this larger tonnage might be is questionable.

This mineralization definitely seems to occur in a series of calcareous beds in meta sediments. These beds, and at least eight have been named and correlated, dip 40° west and strike N. 15° E. The uppermost or M bed is 20 feet thick and, with four other beds, shows strike and dip persistence. All are cut by normal post-mineral faults.

Mine Future In Metallurgy

To date no method has been developed to separate and recover the cop-

per, molybdenum, and uranium in marketable concentrates. While underground development has been favorable, much time and money will be necessary to make this low-grade section a paying mine, and perhaps the area will prove too low grade or too small for a profitable operation.

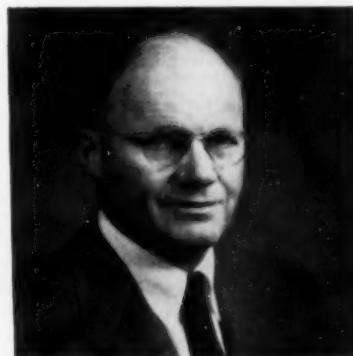
The iron ore beneficiation plant, without question, will prolong the life of the mine and permit upgrading of several millions of tons of heretofore unmarketable ores.

Underground mining holds the key to the future of Philippine Iron Mines.

The long experience of F. W. Denton, Jr. general superintendent, in the deep mines of Michigan will be of increasing importance as the pit ores are worked out.



O. A. BONI
Vice President



F. W. DENTON, JR.
General Superintendent

How The Philippine Government Helps The Mining Industry Grow



By **BENJAMIN M. GOZON**

A base metal boom is in the making in the Philippines. Almost all the base metal mines and some of the gold mines are searching for unknown mineral deposits for increased production. At least eight new properties are in the development stage and will be in production this year or next. The Philippine government is sparing no efforts to make the climate attractive to mineral investors.

Mining Started for Gold

Gold mining came into prominence during the first quarter of this century when Americans started developing the gold district of Baguio, Mountain Province. The Paracale and Masbate districts followed.

Between 1933 and 1941, the Philippines ranked as the third largest gold producer under the United States. In 1940, it produced 1,095,180 ounces. The 10-month production of gold for 1941 was 1,029,942 ounces and gold mining would have been the premier industry of the Philippines had it not been for the outbreak of World War II.

A few years before the war, because of the great demand for war materials, the mining industry branched out into chromite, copper, and manganese. One of the world's largest deposits of refractory chromite was discovered in Zambales Province. Fairly large deposits of metallurgical

chromite were found in the same province, and also in Camarines Sur and Oriental Misamis. The century-old copper deposit of Mankayan-Suyoc and the chalcocite deposit of Rapu-Rapu, Albay, were developed and operated with modern equipment. Rich, though comparatively small, deposits of manganese in Busuanga, Coron, Siquijor, and other places were mined without too much regard for future operation so only high-grade ores were produced to take advantage of the favorable market prices at the time. Thus, before 1941, the Philippines had a very promising gold mining industry, and a fair start in base metal mining.

With the exception of chromite and manganese, the development of mineralized areas during pre-war years was confined to those known to the Spanish conquistadores, and even to the Chinese miners who came to the Islands centuries ahead of them. It is true that between 1933 and 1936 a flurry of exploration spread all over the Islands as a result of the mining boom but most of the mineral prospecting done at the time was superficial in character and hardly of the type that could be relied upon.

Mineral Potential Great

In spite of inadequate mineral surveys the consensus of opinion among mining men, even at that time, was that the Philippines has great mineral potentialities. The results of postwar surveys, both by the Philippine Bureau of Mines and private parties, bear this out more and more. The country has averaged a yearly mineral production of 138,000,000 pesos in gold, silver, copper, iron, chromite, manganese, lead, zinc, and a few non-metallics since 1951. Postwar values may not be a good yardstick to gauge the increase of production volume; nevertheless, they reflect the tremendous activity in local mining during the last four years when one remembers that right after liberation in 1945 all mines in the Philippines were either destroyed or left inoperative, and mineral production was almost nil.

Geologic Mapping Underway

The Philippine Bureau of Mines and the local mining industry have embarked on an aggressive program

that will cover nation-wide exploration, development, and mining of mineral resources. Of course, these activities greatly depend upon many factors, the more important being available venture and investment capital—both local and foreign—technical know-how, equipment, reliable and steady market, and a set of workable mining laws and regulations that are comparable with those now in effect in the progressive mineral producing countries of the world. (See comparison chart for details.)

Many properties in different parts of the Islands are receiving a great deal of attention from local and foreign capitalists. If preliminary explorations prove encouraging, the chances are that mining investments in the Philippines will receive a big boost. One advantage of prospecting in the Philippines is that a large virgin area is available; extensive scientific exploration was started only after the last war so there are excellent opportunities for making important discoveries. The area geologically surveyed to date by the Philippine Bureau of Mines covers only about 2,892,000 hectares. Of this area, 1,450,000 hectares have been located and applied for, and only 12,340 hectares have been developed and/or mined. Thus, of the entire land area of the Philippines (29,750,000 hectares), only 9.72 percent has been geologically surveyed, 4.86 percent has been located for mineral development, and only 0.04 percent has been actually developed and mined.

Opportunities for Americans

From 1901 to November 15, 1935, when the Philippine Constitution took effect, the freehold system of mineral disposition was the one in force in the Philippines. Most of the gold mines now in operation come under this system. The new Mining Act approved on November 7, 1936, recognizes the leasehold system. Leases are granted for 25 years, renewable for another 25 years by citizens of the Philippines or by corporations or associations where at least 60 percent of the capital is owned by such citizens. For the duration of the Parity Amendment to the Philippine Constitution, however, citizens of the United States, and all forms of business enterprises owned

Director, Philippine Bureau of Mines
Executive Secretary, Gold Subsidy Board
Chairman, Petroleum Technical Board

or controlled, directly or indirectly, by citizens of the United States have the same opportunities and obligations as those imposed upon citizens of the Philippines, or corporations or associations owned or controlled by Philippine citizens. This provision is reiterated in the Laurel-Langley Agreement which has been approved by the Philippine Government and is awaiting only the approval of President Eisenhower on the part of the United States.

To complement the activities of private enterprise and to encourage the development of more mines, the Philippine government has embarked on a program of projects and assistance that touches on the more important phases of mineral development and production.

Detailed surveys of a few areas had been made but those were confined to known gold regions, to a portion of the lateritic iron deposit of Surigao, and to a number of scattered occurrences of copper in two or three provinces of Visayas and Mindanao. To augment this important work, the government, through the Philippine Bureau of Mines and with the help of the U.S. International Corporation Administration (ICA) and the Philippine Council for United States Aid (PHILCUSA), started in 1952 intensified surveys for deposits of strategic minerals, principally copper, chromium, iron, manganese, molybdenum, lead, zinc, and nickel, together with surveys for coal and ceramic materials.

Late in 1953, a preliminary radiometric survey of certain regions of the Islands was made by geologists of the United States Atomic Energy Commission and of the technical staff of the Philippine Bureau of Mines. Results of this survey showed indications of radioactive mineral possibilities verified subsequently by the discovery of uranium minerals in Larap, Camarines Norte.

Many Types Technical Aid

The survey for manganese, actually started under the Point 4 program, has been completed for the islands of Siquijor, Busuanga, and Bohol. For copper, begun about a year ago, three areas have been covered in Luzon, and two in Visayas. The nickeliferous serpentine and laterite of Nonoc Island, Surigao, is presently under investigation as a possible source of nickel. The preliminary smelting tests proved quite satisfactory with a production of a high grade, low-carbon ferronickel alloy. The alloy recovered from calcined serpentine contained 68.3 percent Ni and 61.6 percent Fe.

SEPTEMBER 1955

MAJOR POINTS IN PHILIPPINE MINING LAWS

No income tax for initial 3-year period but tax to apply in this period as soon as capital investment is returned.

Income tax set at 28 percent maximum through 1956.

Government encourages export of minerals.

Depletion and depreciation formula similar to United States and Canada under study.

Philippine government licenses engineers. Visas granted for foreign engineers.

United States citizens and corporations have similar rights as Filipinos for company ownership.

Mining leases granted to United States controlled firms the same as to Filipino firms. Leases for 25 years, renewable for 25 years.

No special excise taxes on foreign exchange for purchase of equipment and supplies.

WHAT FOREIGN LAWS UNITED STATES COMPANIES WANT TO ENCOURAGE INVESTMENTS IN MINES

World-Wide
Copper Producer

World-Wide
Base Metal
Producer

An Important
Smelting Company

No income tax until investment amortized.

After capital amortization income tax at maximum rate of 50 percent of net.

No restrictions or taxes on metal or minerals exports.

Right to select and hire technical staff and to pay them in any currency.

No import duties on equipment and supplies necessary for operation.

Free Market rates of exchange and change on all currency.

No restrictions on payments of profits use metal sales in any country. The right to income to pay all bills.

Initial tax-free period to recoup initial investment, say 3 years.

Rapid amortization of mine and plant investments (Similar to that in U. S. A.)

No production and export tax on metal output.

Provision for percentage depletion in tax laws (Similar to the U. S. A.)

Company management in hands of necessary engineers appointed by company.

Right to own stock in any amount in one or more local companies.

Right to hold as many mining claims as needed for operations.

Payment of annual earnings, to ten percent, in any country with no exchange tax.

The overall results of the electric furnace smelting investigation indicated that 35 pounds of nickel, as alloy, can be recovered from each dry ton of ore, and that the process is commercially feasible.

Under the ICA-Philcusa program, drilling equipment for exploration drilling is made available to private parties on a lease basis under terms regulated by the Philippine Bureau of Mines. This is of particular help and advantage to small mines or prospects which cannot otherwise afford the use of such costly equipment.

Also at the Philippine Bureau of Mines, mining people get technical aid in the form of beneficiation tests of low-grade ores or studies of end-uses of minerals. So far Philippine minerals have not had the benefit of metallurgical studies that they deserve.

On the subject of financial help from the government to the mining industry, the local Rehabilitation Finance Corporation initiated, some five years ago, the granting of mining loans to deserving mines that need additional capital for rehabilitation purposes. Property valuations were usually performed by the Philippine Bureau of Mines before grants were made or applications rejected. Experience in the past seemed to bear out the contention of mining people that the money available for loan purposes was inadequate and that the terms were rather onerous. For this reason present plans of financial aid under study are expected to be more liberal in both amount and terms for the miner.

In 1954, the Philippine government, realizing the dangers of closure of the gold mines due to increasing cost of production and the declining local free market price for the metal, approved the Emergency Gold Assistance Act. (See chapter on gold mines for details.)

Favorable Tax Laws

Benefitting the gold and base metal mines are tax reductions and exemptions. These refer particularly to the reduced flat rate of a 1½ percent production tax on all mines; to the exemption from payment of the special excise tax of 17 percent on foreign exchange on payments for importation of machinery, equipment, accessories, spare parts, carbide, explosives and dynamite for mining purposes; and to the exemption from payment of income tax by certified new mines and old mines resuming operations, during the first three years of actual commercial production, with the proviso that "any such mine and/or mines

making a complete return of its capital investment at any time within the said period shall pay income tax from that year."

The regular corporate income tax rate is 12 percent. However, this rate has been temporarily increased to 28 percent to December 31, 1956, in order to help improve the financial position of the government.

The Philippine Bureau of Mines has under study a formula for the computation of depletion and depreciation charges that will be comparable with those in force in the United States and Canada which are favorably acceptable to the mining industry.

Under the present administration of President Magsaysay, peaceful and orderly conditions have greatly improved throughout the Philippines. Particular areas which heretofore have not been accessible to mining exploration and development are now open.

To insure a high degree of engineering skill, the Philippine government has established a Board of Examiners for Mining Engineers which examines and licenses engineers. Chairman of the Board is M. M. Aycardo, Jr.

It is gratifying also to note that President Magsaysay, in visualizing an industrialized Philippines, has not lost sight of two important prerequisites—roads and power. Hydro-electric power plants are being pushed through, like the Maria Cristina in Lanao, Mindanao, and the Ambuklao in northern Luzon. Road building is going ahead with priorities given to the areas where transportation facilities are needed most; for instance, in

many parts of sprawling Mindanao. The construction of feeder roads will aid immeasurably to the development of good, but presently inaccessible, mining properties.

More Island Refining

Some local and foreign capitalists are much interested in the possibility of processing locally mineral raw materials into finished or semi-finished products. This would be a partial solution. It ties in with the government program of industrialization.

At this writing all indications seem to point to the fact that the government is set on having an iron and steel industry. This would boost the chances of a ferro-alloys industry, and possibly spark the chain reaction that would give rise to other metal industries that everybody is expecting and hoping for. Naturally this will also have a tremendous effect on the dormant coal industry. The impact of industrialization on the mining industry, even on a modest scale, will certainly change the tempo of Philippine mineral production to a much faster rate. It may well change the nation's role from supplier of mineral raw materials to manufacturer or exporter of processed or semi-processed metals or metal products. This would certainly be to the advantage locally of all concerned.

In any event, the goal of the Bureau is to see the mining industry regain its premier position among the other industries of the Philippines in the next three to five years. The Philippine Bureau of Mines gives full cooperation and encouragement to all mining investors, domestic or foreign.



PHILIPPINE GOLD SUBSIDY BOARD in session. Chairman Salvador Araneta in the center is the Secretary of Agriculture and Natural Resources. Reading clockwise from the chairman are Deputy Governor Andres Castillo of the Central Bank of the Philippines, representing Bank Governor Miguel Cuaderno; Servillano Aquino, mining engineer; Benjamin M. Gozon, Executive Secretary, and Director of the Philippine Bureau of Mines; Simplicio Arquisola, representing Secretary of Labor, Eleuterio Adevos; and Amado Brinas, representing Secretary of Finance Jaime Hernandez. Mr. Araneta has resigned since this picture was taken.



PREMIER PHILIPPINE GOLD PRODUCER is the Antamok mine of Benguet Consolidated Mining Company near Baguio, Mt. Province.

Free Market Sales and Government Assistance Keep Gold Mines Alive

The gold mines are still a very important segment of the Philippine mining industry, although base metals have outstripped them in value of output and as dollar earners. During the past two years gold virtually ceased being a dollar earner as permission was granted by government authorities to sell all locally produced gold in the Manila Open Market. Such permission was necessary because to have enforced the international fixed price would have forced all producers to cease operations.

However, since the Gold Subsidy Act (described below) was implemented early this year the industry has once more begun to bring in dollars, though only to the extent of about 33½ percent of their total production. Plans are now afoot for the government to absorb the entire production on a subsidy basis, thus again making the gold industry a 100 percent dollar earner. The problem is one of financing this aid and making the aid sufficient to keep the gold mining industry going.

At present, Philippine gold mines can operate only because the economy of that country is short of United States dollars. Favorable exchange rates have brought the gold to its present rate of approximately 100 pesos per ounce. Highest gold price was in 1951 when it touched 156 pesos, while the low for the past six years was reached recently with 95 pesos per ounce.

It is, therefore, an understatement to say that problems are difficult. Fortunately, the Philippine Government has developed a realistic program to maintain the industry, and the various company engineers are contributing toward the common effort by successfully meeting the challenge of lower grade ore and diminishing reserves with better equipment, more mechanization, closer supervision, and accurate cost control.

The Philippine Gold Producers Association, Inc. acts as a clearing house and spokesman for the gold mines. It works closely with the Philippine Bureau of Mines and the Gold Subsidy Board in carrying out the provisions of the Emergency Assistance Act.

Economics of Peso Exchange

The gold mines could be put out of business by strengthening of the Philippine peso in terms of exchange with United States dollars, and if the peso were freed for dollar converti-

bility for any purpose. There has been evidence of peso firming in the last six months, which accounts for the decline in the Free Market price for gold in Manila in recent months from 114. Pesos to as low as 95 Pesos per ounce. At the same time the Hong Kong price has remained at about an eight-peso premium.

How Government Helps

On June 20, 1953, partial tax relief was granted gold producers for a three-year period; on June 18, 1954, and for a two-year period thereafter, the provisions of the "Emergency Gold Mining Assistance Act of the Philippines" went into effect. This means that newly mined gold produced as a principal product may be sold either to the government through the Central Bank at the current official price, plus the assistance described below, or in the domestic Free Market without benefit of the assistance.

To determine the rate of assistance mines are termed as "marginal" and "over-marginal." Marginal mines are those which made a total net profit in 1953 less than what shall be determined (by a fixed formula) as base profit for the particular mine. Over-marginal mines are any mines which operated in 1953 and whose net profits were larger than the "base profit."

The marginal and over-marginal mines receive different rates of assistance. Marginal operating mines receive government aid to bring the official price plus assistance to a total of 111.72 Pesos per ounce. Over-marginal mines receive a total of only 105.40 Pesos. This assistance, moreover, is very limited in that the Subsidy Act provides only a limited amount of funds to pay the premium price.

Where Money Comes From

The gold mining industry, in effect, pays its own assistance, because revenue for the "Emergency Gold Assistance Trust Fund" is derived from or created exclusively by the gold producers. Here is the way it works. An amount of money equivalent to the sum of the internal revenue taxes, production tax, business taxes and licenses, customs duties, and other charges payable by gold producers directly or indirectly (except those otherwise allocated by law for other purposes), as well as those funds



arising from allocations of foreign exchange equivalent in value to gold sold to the Central Bank, is certified to the Central Bank. Upon certification, the Central Bank charges the National Treasury an amount equivalent to such certification and this sum is placed in a trust fund known as "Emergency Gold Assistance Trust Fund." From this fund assistance is allocated to each gold producer in accordance with the provisions of the law.

This has meant that when the price on the Free Market was in the neighborhood of 111.72 Pesos per ounce—and it was for several months up to the first part of 1955—payments from the fund were relatively small. With the recent dropping of the Free Market price, Free Market sales have declined, and the result has been that the fund has been called upon to make greater and greater payments. The over-all result has created a difficult situation, with total aid bringing smaller assistance than the plan contemplated, because as before men-

tioned, the subsidy can absorb only one third of the total gold production.

Free Market Sales

There has been a good market in Manila for gold bullion containing about 30 percent silver. Such bullion is sold for pesos. The buyer then refines the bullion and converts it to marketable bars or slugs. These are presumably "exported" to Hong Kong and Maco and sold. Because of the spread in price between Manila and Hong Kong the transaction is profitable. Payment does not always have to be made in pesos. For example, it is almost impossible to get United States dollars in Manila to pay for imports of such luxuries as lipsticks. But if Philippine pesos or Hong Kong dollars or United States dollars are available in Hong Kong from gold sales for purchase of lipsticks, there is created a good business opportunity. Buy lipsticks and ship them to the Philippines. Despite the tariff on luxuries the lipsticks can be sold in the Philippines for pesos at a handsome

price and profit. That means more pesos to buy more gold.

Now the Free Market is a very touchy thing. In recent months gold from Europe and Australia has been available for sale and has been a factor in lowering demand. Another item which has had a depressing effect on price has been the seizure of gold carriers. Be it in Manila or in Hong Kong, the effect has been the same—an immediate lowering of price.

Gold Mines Cut Costs

The best way to make gold worth more and the one way in which the companies have absolute control is to reduce their costs for producing gold. Here are some of the ways now being used: increase tonnage, concentrate mine development in areas where higher than average grade ore should be found; increase mechanization; install larger capacity machines; mine with both smaller and less timber; cut drilling costs with Airlegs and tungsten carbide bits; get more work out of underground crews by the use of a bonus system; use sand filling of stopes, instead of timbering; increase extraction of gold from ores; buy equipment and supplies directly from the foreign manufacturer, so as to eliminate the agent's or jobber's commission; and very carefully survey all sources of supply to take advantage of local bargains (natural rubber in Malaya, cyanide in Canada, etc.).

Benguet Sets Gold Pace

Benguet Consolidated, with its subsidiary, the Balatoc Mining Company, is the operator of a 2,800-ton-per-day cyanide mill. This mill replaces two pre-war mills, each operated separately by the two companies.

Benguet is not standing still. The progressive attitude of the company is best illustrated by a question asked by President Haussermann. "What do you see in our operations that could be improved by following the latest United States practices?" Frankly, the latest technical developments and new equipment are known to the company's staff, and are adapted, where applicable, under operating conditions.

Benguet is a base metal producer, too. In fact, it is the world's largest miner of refractory grade chromite under its Consolidated Mines contract which is more fully described under the chapter on chromite.

Benguet mined 1,049,585 short tons of ore and recovered 196,473 fine ounces of gold in 1954. Total Philippine production was 2,012,735 tons and 416,052 ounces.

Continued on page 76

MINING WORLD



JUDGE J. W.
HAUSSERMANN
President, Benguet Cons.



H. A. BRIMO
President
Baguio Gold



J. B. HARRISON
Manager
Surigao Consolidated



C. E. FERTIG
General Superintendent
Itogen Mining



I. CASTRO
Mill Superintendent
San Mauricio



R. B. MAHAN
General Manager
Baguio Gold



A. P. DAVIDSON
General Superintendent
Benguet Consolidated



R. W. CROSBY
Vice President
Benguet Consolidated



C. L. ELLIOT
Ass't General Sup't
Benguet Consolidated



LEPANTO COPPER is truly one of the world's great mines. Picture at left shows the outcrop which is bisected and offset by steeply dipping fault. Footwall ore zone is in center cliffs. Hanging wall zone is brush-covered at top right. New flotation



mill, at right, treats 1,200 tons of ore daily. Water storage tanks are on the site of the pre-World-War-II mill. The mill is 1,000 feet down the canyon from mine portal. Both pictures were taken from power plant.

Metallurgical Testing Underway For Lepanto Copper Expansion



One of the world's important copper mines—that of Lepanto Consolidated Mining Company—is located in northern Luzon. This mine is important because of its copper production, large developed ore reserves, excellent opportunities to appreciably increase reserves along geologically favorable structures, efficient management, and the unusual occurrence of enargite (Cu_3AsS_4) in such large quantities. Yet Lepanto is not even mentioned in many books and texts outlining the world's great mines and mineral deposits.

Why is Lepanto important? Consider these statistics for the answer: Production of 76,866 tons of copper and 254,158 ounces of gold from the end of World War II through 1954; total ore reserves as of December 31, 1954 of 2,789,430 short tons, assaying 4.03 percent copper and 0.153 ounce gold per ton; cost of producing and marketing one pound of copper—18.3

cents in 1954; payment of 21,980,000 Pesos in post war dividends.

Metallurgy Is Expansion Key

The company is expansion minded, too. However, even after the major mine improvement program now under way is completed a change in metallurgy is mandatory for expansion, in effect, the company finds itself in a transportation bottleneck—both tonnage-wise and costwise. Mining of more ore only increases the problem. In 1954 the actual cost of mining and milling was only 6.8 cents per pound of copper, while the marketing cost was 8.3 cents. Trucking of concentrate from the mine at Lepanto over the

Mountain Road to the shipping port of Poro on the China Sea costs 24.00 Pesos per wet ton.

In general, the ore seems to have an increasing iron pyrite content. However, when this pyrite is depressed in the mill the gold recovery drops markedly. Gold is of growing importance with 20 to 25 percent of income from gold sales. These factors very definitely control the grade of concentrate that can be shipped. Less tonnage of higher grade copper concentrate results in less income.

Pilot Plant Studies

A variety of metallurgical improvements have been suggested and are being studied on a pilot plant scale. The first is flotation of a bulk concentrate, about 200 tons per day. Treatment of this concentrate would be in a separate circuit with regrinding and depressing of iron while promoting copper and gold. It may be possible to discard and stockpile for future treatment a middling assaying about 0.50 percent copper and 0.14 ounce gold per ton.

A new HMS plant is also under consideration. Test work to date on a minus-1-inch, plus- $\frac{3}{4}$ -inch feed to a 2.63-2.65 specific gravity media indicates successful rejection of 40 percent of feed. This is important as cost of fine crushing and grinding of the very hard, tough, and abrasive ore is high. With a 2,000 ton per day feed to HMS plant the present 1,200 ton flotation capacity could adequately treat the sink concentrate.

By any standard Lepanto is a big and important mine. It will continue to be so at any foreseeable copper price.



HMS PILOT PLANT concentrate is checked by general superintendent C. B. Foster (left) and mill superintendent H. E. Brown.

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- 4 Link-Belt 365 with 7 1/2-yd. ESCO Coal Loading Dipper.
- 5 Marion 362 with 1 1/4-yd. Bucket.
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In Canada
Vancouver, B.C.
Toronto, Ontario

Gold Mines

Continued from page 74

San Mauricio Mining Company (Marsman) at Jose Panganiban on the eastern Luzon coast is the third largest gold mine in point of 1954 output. The mine is characterized by high-grade shoots of ore in narrow veins. About 20 percent of the mine income is from byproduct copper, lead, and zinc recovered in flotation concentrates which are marketed in the United States.

The next largest gold mine, and also an important lead-zinc producer, is the Surigao Consolidated Mining Company at Surigao, northern Mindanao. Ore occurs in veins in igneous rocks and as replacement deposits in sedimentaries. The company has mechanized and increased production to permit production of lower grade ores.

Also in the Baguio district is the Itogon mine of the Itogon Mining Company (Marsman). Production in 1954 was 190,434 tons, from which 35,684 ounces of gold were recovered. Output per man shift is now 0.6 ton per shift which is higher than prewar. Costs have been lowered by sand filling stopes.

At Baguio Gold Mining Company, careful management has been an important factor in maintaining operations in the face of worsening grade. Despite the tripling of development footage, ore reserves have not kept pace with mining. However, through an agreement with an adjoining company, it is very possible that adequate ore can be developed for mill operation for several years.

Without exception, all of the above companies are intensively searching for new properties—exclusively base metals, in fact. Several also are exploring and developing new copper areas.

Critical Period Ahead

Despite every technological development, coupled with a high degree of mechanization, the inescapable fact is that the gold mines have a bleak long-term outlook. The greatest tonnage of ore now being treated is low grade. The mines must continue to have help of some kind to insure their gold sales at higher than 70 Pesos per ounce.

Expiration date of the Emergency Assistance Act is June 18, 1956. It is an important date to remember for Philippine mining and for the entire Philippine economy. It is known that studies are being conducted to achieve a more satisfactory and long-range legislative program designed to help the industry. No industry ever needed help more.

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U.S.A. Metal & Mineral Prices

METALS

August 22, 1955

COPPER:	Electrolytic. Delivered F.o.b. cars, Valley basis	40.00¢
	Lake. Delivered, destinations, U.S.A.	40.00¢
	Foreign Copper. Valley basis	40.00¢
LEAD:	Common Grade. New York	15.00¢
	Tri-State Concentrates, jig, flotation 80% lead, per ton	\$187.50
ZINC:	Prime Western; F.o.b. E. St. Louis	12.50¢
	Prime Western; Delivered, New York	13.00¢
	Tri-State Concentrate, 60% zinc, per ton	\$76.00
	Primary 30 Pound Ingots (99% plus). F.o.b. shipping points	24.00¢
	Lone Star Brand. F.o.b. Laredo, in bulk	33.00¢
	(In ton lots) price per pound	\$2.25
	Sticks and bars. 1 to 5 ton lots (Price per pound)	\$1.70
	97-99%, keg of 550 pounds (Price per pound)	\$2.60
	Powder	Nom., per pound \$119.25
	98% (per pound)	\$10.00-\$13.82
	Ingots (99.8%) F.o.b. Valasco, Texas, per pound	33.70¢
	Flasks. Small lots, New York	\$253.00-\$255.00
	"F" Ingots (5 pounds). F.o.b. refinery, Port Colborne, Ontario	64.50¢
	Grade A. Brands. New York (Price per pound) Prompt delivery	96.75¢
	99.3% + Grade "A" (Price per pound)	\$3.50-\$3.95
	United States Treasury Price	\$35.00 per ounce
	Newly mined domestic. United States Treasury price	90.50¢ per ounce
	Foreign Handy Harmon	90.75¢ per ounce
	Per Ounce	\$80.00-\$87.00
	Sponge, Per Pound	\$10.00
ALUMINUM:		
ANTIMONY:		
BISMUTH:		
CADMIUM:		
COBALT:		
COLUMBIUM:		
LITHIUM:		
MAGNESIUM:		
MERCURY:		
NICKEL:		
TIN:		
TITANIUM:		
GOLD:		
SILVER:		
PLATINUM:		
ZIRCONIUM:		

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, Colorado	\$47.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H.	
	Visual inspection at \$400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, \$40 per unit; 9.0 to 9.9%, \$45; over 10.0%, \$50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr ₂ O ₃ . 3 to 1 Ratio	\$44.00-\$45.00
	African (Transvaal). 48% Cr ₂ O ₃ . No Ratio	\$31.00-\$32.00
	Turkish, 48% Cr ₂ O ₃ . 3 to 1 chrome-iron ratio	\$48.00
	U. S. Government ore purchase depot Grants Pass, Oregon. Base price, lumpy ore, \$115.00; fines and concentrates \$110.00 for 48% Cr ₂ O ₃ and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr ₂ O ₃ .	
	At United States small lot beryl purchase depots. \$3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)	
COLUMBIUM-TANTALUM ORE:	Lake Superior. Per gross ton Lower Lake Ports	\$10.10
IRON ORE:	Mesabi. Second quarter	\$10.25
	Mesabi. Bessemer. \$1.5% Fe. Second quarter	\$10.25
	Old Range Non Bessemer. Second quarter	\$10.40
	Old Range Bessemer. Second quarter	\$10.40
	Swedish, Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit	\$22.00¢
MANGANESE ORE:	Metallurgical grade. 48 to 50% Mn. Long ton unit	\$0.89-\$0.91
	Metallurgical grade. 46 to 48% Mn. Long ton unit	\$0.87-\$0.89
	Metallurgical grade. 45 to 46% Mn. Long ton unit	\$0.77-\$0.80
	Chemical grade. 80% MnO ₂ . Per Ton	\$70.00
	Domestic U. S. Government ore purchasing depots: Deming, New Mexico; base price \$2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Butte, Montana; (black and pink ores) base price of \$4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of \$6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) \$2.30 per unit with premiums and penalties.	
	90% MoS ₂ F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	\$1.05
	Domestic. 60% WO ₃ . Per short ton unit	\$63.00-\$65.00
	Foreign. 65% WO ₃ . Per short ton unit (Scheelite)	\$33.50
	Foreign. South American, Spanish, Portuguese	\$32.50
	Carnotite-Roscoelite. F.o.b. purchase depot plus \$0.04 per ton mile (\$6.00 maximum). Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado	
	Salt Lake City, Marysville, Thompsons, Moab, White Canyon, Green River, and Monticello, Utah. Shiprock, and Bluewater, New Mexico, Edgemont, S. Dakota, Riverton, Wyoming, and Custer, Arizona. Base price for 0.10% ore is \$1.50 per pound and up to \$3.50 per pound of contained UO ₃ plus \$0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of \$0.25 per pound for each in excess of 10 pounds. A \$0.50 per pound development allowance paid on all ore purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime. At Monticello ores will be paid for in accordance with metallurgical characteristics.	
	Carnotite-Roscoelite. V ₂ O ₅ in ratio of more than 10 parts to 1 part of UO ₃ are generally acceptable at all AEC depots, but excess not paid for at Marysville, Monticello, Shiprock, and Bluewater	Per Pound V ₂ O ₅ \$0.31
URANIUM ORE:		
VANADIUM ORE:		
BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots	\$12.50
FLUORSPAR:	Oil Well grade. Packed in 100 pound paper bags	\$14.00
	Metallurgical grade. 70% effective CaF ₂ content per short ton F.o.b. Illinois-Kentucky mines	\$28.00
	Mexican. 70% f.o.b. border	\$22.00
	European, Atlantic Ports, 70%	\$30.00
	Acid Grade, 97% CaF ₂ F.o.b. Kentucky, Illinois, Colorado	\$50.00
	Crude: F.o.b. mine per short ton	\$3.00 to \$5.00
	Plaster grades. Crushed and sized. F.o.b. plants	\$7.00 to \$9.00
	Long ton, F.o.b. Hoskins Mound, Texas	\$25.50
	Export	\$30.50
PERLITE:		
SULPHUR:		

NON-METALLIC MINERALS

COPPER:	Electrolytic spot	\$368	0s	Od	46.00¢
LEAD:	Refined, 99.9%	E105	15s	Od	13.22¢
ZINC:	Virgin, 98%	E 89	7s	Od	11.18¢
ALUMINUM:	Virgin, 99.5%	E171	0s	Od	21.375¢
ANTIMONY:	Regulus, 99.6%	E222	10s	Od	27.81¢
TIN:	Standard, 99.75%	E756	0s	Od	94.50¢
TUNGSTEN:	Long ton unit, 257s equivalent to \$35.98				

LONDON METAL AND MINERAL PRICES

August 18, 1955
Per Long Ton USA Equivalent cents per pound:

COPPER:	Electrolytic spot	\$368	0s	Od	46.00¢
LEAD:	Refined, 99.9%	E105	15s	Od	13.22¢
ZINC:	Virgin, 98%	E 89	7s	Od	11.18¢
ALUMINUM:	Virgin, 99.5%	E171	0s	Od	21.375¢
ANTIMONY:	Regulus, 99.6%	E222	10s	Od	27.81¢
TIN:	Standard, 99.75%	E756	0s	Od	94.50¢
TUNGSTEN:	Long ton unit, 257s equivalent to \$35.98				

1. With Sterling pound at \$2.80.

Quotations on metals and certain ores through the courtesy of American Metal Market, New York, N. Y.

United States

Personalities in the News

EDWIN H. CRABTREE, JR., deputy manager of the Grand Junction, Colorado, Operations Office of the United States Atomic Energy Commission, has been named director of the Colorado School of Mines Research Foundation, Inc. He began his duties August 1 as head of the college's famous research division and experimental plant. Mr. Crabtree has a background of more than 27 years in various phases of the mining and metallurgical industries, including 19 years with the Eagle-Picher Company. He served as metallurgist for the Arizona Bureau of Mines for several years, and in 1952 won the American Institute of Mining and Metallurgical Engineers' award as "Mill Man of Distinction." Mr. Crabtree, a 1927 graduate of the Colorado School of the Mines, replaces **VERNON L. MATTSON**, who accepted the position of manager of mining and ore processing for Kerr-McGee Oil Industries, Inc. (See MINING WORLD, August 1955, Page 63).



William B. Porterfield, Jr., National Potash Company, has been named vice president and sales manager. National Potash is jointly owned by Freeport Sulphur Company and Pittsburgh Consolidation Coal Company and is constructing a mine and plant near Carlsbad, New Mexico.

Neal M. Muir, formerly engaged in examination work with the United States Bureau of Mines, Spokane, Washington, is now making his headquarters in Grand Junction, Colorado. Since January he has been engaged on mine examination in Colorado, Utah, and Arizona and has recently returned to Grand Junction for an examination of uranium prospects in New Mexico and western Texas.

Allen F. Agnew, Platteville, Wisconsin, has accepted a position as associate professor of geology at the University of South Dakota, Vermillion, South Dakota. He was formerly in charge of the Wisconsin and Iowa zinc-lead project in Platteville for the United States Geological Survey.

New staff members at Chapman and Wood, consulting mining engineers, Albuquerque, New Mexico, include **Thomas J. Thorne**, mining engineer, and **Rudolph G. Strand**, **Herbert J. Toohey**, and **John P. Elberti**, geologists.

Peter R. Peterson has been named general manager of mining operations for Carolina Mines, Inc., Kings Mountain, North Carolina. He was also elected to the company's board of directors at a recent board meeting.

William D. Stone, Great Lakes Carbon Corporation, is now assistant manager of the geology and quarry operations department, perlite and dicalite division. The firm has headquarters in Florence, Colorado and Socorro, New Mexico.

Frank E. Cash, United States Bureau of Mines, has retired after 33

years with the Bureau. Most recently stationed in Washington, D.C., he has served in Pittsburgh, Pennsylvania; Birmingham, Alabama; Duluth, Minnesota; and College Park, Maryland.

A. J. Nicoli, vice president of Putman Minerals, Inc., was elected president of Rimrock Uranium Mines, Inc., Grand Junction, Colorado. Also associated with the firm are **H. L. Rowley** and **Charles Hayes**, who are active in the Louisiana oil industry. Rimrock has properties in the Circle Cliffs mining district, Garfield County, Utah and in the Paradox mining district, Montrose County, Colorado.

T. A. Bedford, vice president, Kaiser Engineers, is now located at the Oakland, California headquarters of the company.

Arthur M. Gaines has joined the staff of Climax Molybdenum Company, Climax, Colorado as a master mechanic in the mill and crusher department. He was construction superintendent for O. W. Walvoord, Inc., Denver, Colorado before coming to Climax and was in charge of the construction of several metallurgical and mining plants including the recent Osceola project for Calumet and Hecla, Inc., Calumet, Michigan. Also recently employed at Climax were **Ralph Meyertons**, metallurgist, and **John England**, engineer's helper.



Officials of the Mack-Lang Uranium Corporation, Lander, Wyoming are pictured above as they prepared to watch their first load of ore being dumped into the hopper of the crusher at the United States Atomic Energy Commission buying station at Riverton, Wyoming. From left to right they are: **C. I. THOMPSON**, vice president and company geologist; **CHARLES BRUNER**, station manager for the American Smelting and Refining Company, which operates the depot for the AEC; **JERRY LANGFORD**, son of one of the firm's principal stockholders; **RALPH CUSHMAN**, vice president in charge of exploration and production. The ore was produced from claims on the southern flank of Crooks Mountain in Fremont County, Wyoming.

SIM S. CLARKE, general superintendent of Tri-State Mines, Eagle-Picher Company, has resigned his position to enter private consulting practice on mine mechanization with headquarters in Baxter Springs, Kansas. Mr. Clarke pioneered low-cost mechanized underground mining in the United States, featuring off-track Diesel-powered equipment. His work at Eagle-Picher has resulted in the mining of lower grade ores. Under his supervision mines in the Tri-State area have become testing grounds for all types of mining equipment.



Three vice-presidential appointments have been announced at Battelle Institute, Columbus, Ohio. Named were **B. D. Thomas**, **David C. Minton, Jr.**, and **John S. Crout**, all three of whom are already associate directors at the Institute.

Joseph W. Smith, mill superintendent of Miami Copper Company, Miami, Arizona, retired last month. He had been with the firm since 1912.

John A. Beecroft, mine inspector for Itasca County, Minnesota, resigned during July and has been succeeded by **Glen V. Jones**, assistant mine inspector.

Richard W. Lottridge, veteran mining engineer, is now assistant to the president of Federal Uranium Corporation, Salt Lake City, Utah. He will be in charge of all Federal's mining and exploration operations. He was formerly assistant to the vice president of Combined Metals Reduction Company and has had extensive mining experience in Idaho, Washington, and Nevada.

J. D. Jenkins and **Robert W. Hougland** are recent additions to the engineering staff of International Minerals & Chemical Corporation, Carlsbad, New Mexico. Both men are junior engineers, Mr. Jenkins in the maintenance and engineering department and Mr. Hougland in the mine department.

Jack H. Mosher has taken over duties as assistant plant superintendent for the W. S. Moore Company. He had been employed as a mining engineer for the firm, which is opening two new operations next year at O'Brien and Marisca, Minnesota.

Robert W. Berkahn has taken a position as plant metallurgist at the Humboldt Mine, Cleveland Cliffs Iron Company. **Richard Smith**, who formerly held the position, has been transferred to the Republic mill.

David Rice and **Armando Perini** both have been promoted to the position of mine foreman at the Potash Company of America, Carlsbad, New Mexico. Mr. Rice was formerly a section boss and Mr. Perini, who has been with PCA since 1935, was formerly a shifter. **Frank Blunt**, face boss, was named to replace Mr. Perini as shifter.



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Newsmakers in International Mining

R. H. WILLEY, formerly general superintendent of the Philippine Iron Mines, Philippine Islands has resigned his position at the Larap, Camarines Norte operation and is returning to the United States. He will be headquartered in Kaysville, Utah. He made the return trip by way of Europe and the eastern United States, where he spent some time observing mining methods and ore beneficiation. Before going to the Philippine Iron Mines, Mr. Willey was associated with the Utah Copper Division of Kennecott Copper Corporation.



Michizo Kishi, vice president of the Dow Copper Mining Company, Ltd., Japan, recently was in Mexico completing negotiations with the Mexican government for establishment of a joint copper mining company in the state of Jalisco.

Raoul C. Mitchell, consulting geologist and geophysicist, has completed an assignment in Iraq and in recent months has been touring Jordan, Egypt, Greece, Norway, and Ireland. His headquarters are in Luxembourg, Belgium.

Calamur Mahadevan, a geologist from India, has been sent to Brazil on a technical assistance mission for the United Nations Education, Scientific and Cultural Organization (UNESCO). He will be on leave of absence from his post as head of the geology department at Andhra University, Waltair. Professor Mahadevan will survey mineral resources in the Amazon Valley and will be stationed at Manaus.

William L. Walsh, formerly assistant to the president of Kennecott Copper Corporation, has been elected president of Quebec Iron and Titanium Corporation. The titanium company, with headquarters in New York City, is the owner of a large deposit of titanium-bearing ore located in the Allard Lake district, Quebec, Canada, and also owns and operates an electric furnace plant at Sorel, Quebec. The firm is two-thirds owned by Kennecott, with the other one-third interest held by The New Jersey Zinc Company.

James H. Terry, Cerro de Pasco Corporation, Peru, has been transferred from Cerro de Pasco to the geological department at the Mahr Tunnel.

F. D. L. Noakes, formerly with Rhoango Mine Services Ltd. in Northern Rhodesia, has accepted a position in the department of the consulting engineers for New Consolidated Goldfields Ltd. His headquarters will be at the firm's head office in London, England.

Harley Wallis, Moscow, Idaho, has accepted a position with the Andes Copper Mining Company, Potrerillos, Chile.

Christopher Spence, concentrator foreman for Andes Copper Mining Company, Potrerillos, Chile, has resigned his position and is now back in the United States. He is currently attending the Harvard Graduate School of Business Administration at Boston, Massachusetts.

Octavio Pereda, Cerro de Pasco Corporation, has been promoted to engineer at the Oyoya, Peru operations. He began his career as assayer in the general laboratory and recently has been assistant foreman in the central controls.

Richard H. Kimball, Jr., has joined the staff of the United Nations in La Paz, Bolivia. He was previously a geologist with Cerro de Pasco Corporation, Lima, Peru.

J. David Cerkel and **J. Webb Peoples**, United States geologists, are carrying out a survey of mineral deposits in the Philippine Islands in cooperation with the Philippine Bureau of Mines. They will explore chromite deposits in Zambales, Palawan, Camarines Sur and Dinagat Island in Surigao. Dr. Peoples is the former chairman of the geology department, Wesleyan University at Middletown, Connecticut.

Hans P. Rechenberg, mining geologist and formerly assistant professor at the Technical University, Berlin, Germany, is now associated with the Turk Maadin Sirketi, Istanbul, Turkey.

Ali Lahedi and **A. N. Nehmaty**, Iran Bureau of Mines, have been touring mining operations throughout the United States. Their trip included an AEC tour of the Colorado Plateau uranium region.

E. J. Harrison, Australian geologist, is now working at the Desert Institute, Heliopolis, near Cairo, Egypt, to aid the Egyptian government in its search for underground water resources in the desert. He is on a one-year mission for the United Nations Education, Scientific, and Cultural Organization (UNESCO). Mr. Harrison is a senior geologist for the New South Wales Service.

E. J. Colthorp has been appointed district superintendent of mines (North Central District) for The Consolidated Mining and Smelting Company of Canada Ltd., Trail, British Columbia. **J. E. McMynn**, who held the post since 1953, has been transferred to special duties in the Administrative Controls division.

Henry E. Wessel, International Minerals & Chemical Corporation, Chicago, Illinois, has joined the engineering division as assistant to the vice president. He was formerly with Midwest Research Institute, Kansas City, Missouri.

Charles W. Lee is the new president of Consolidated Western Steel Division, United States Steel Corporation. Previously vice president and general manager of the division, he succeeds **Alden G. Roach**, president of the Columbia-Geneva Steel Division.



DANIEL A. JONES has left Wah Chang Mining Corporation's Benton Mine near Bishop, California to accept an appointment as mining valuation engineer for the Bureau of Land Management with headquarters at Reno, Nevada. Before coming to California in 1954, Mr. Jones was with the Alaska Department of Mines. He had been their mining engineer at Nome since his graduation from the University of Alaska in 1949.

Agatin T. Abbott, assistant professor of geology in the college of mines at the University of Idaho, has accepted the position of associate professor and head of the department of geology and geophysics at the University of Hawaii. Prior to his position at the University of Idaho, he was a consulting geologist in Prescott, Arizona, and had done extensive geological work for various mining companies in the southwestern United States. He began his duties in Honolulu, September 1.

S. N. Mehta, formerly development commissioner, Madhya Pradesh, has been appointed general manager of the steel plant at Bhilai, India.

Frank C. Pickard, head of the mining division of Gregg Car Company, Ltd., New York City, is making an extensive tour of Central and South America. Earlier this year he made an inspection trip through most parts of Africa.

M. H. Forrest, assistant consulting engineer for the Free State mines (Africa) of the Anglo American Corporation of South Africa, has been appointed consulting engineer to the group's copper mines in Northern Rhodesia. He recently completed a study tour of the United States.

F. Elliott has been appointed representative and technical consultant of Messina (Transvaal) Development Company, Ltd., Salisbury, Southern Rhodesia. He is also director of Rhodesia Copper Ventures Ltd.

R. E. M. Blakeway is the new assistant manager of Central Mining and Investment Corporation Ltd., Johannesburg, Union of South Africa.

B. L. Bernstein is the president of the Transvaal and Orange Free State Chamber of Mines for the 1955-56 year. He is associated with the Anglo-Transvaal mining group. **C. B. Anderson**, Union Corporation, and **P. S. Hammond**, New Consolidated Gold Fields, are vice presidents.

G. P. Brooks has been appointed deputy general manager of operations for Zinc Corporation Ltd. and New Broken Hill Consolidated Ltd., Australia. **S. Christie**, manager of Territory Enterprises Pty. Ltd., Rum Jungle, has been appointed assistant general manager, production, at Broken Hill.

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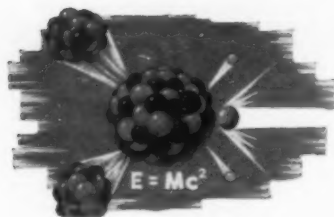
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FISSION FACTS

Monthly Roundup of Mining News
In the Atomic Energy Field

Climax Begins Exploration In Alaskan Uranium Area

Climax Uranium Company, Grand Junction, Colorado, has moved onto the Ross-Adams uranium property near the southern end of Prince of Wales Island, Alaska and is doing geologic work. The company was contacted by the two husband-and-wife teams after their aerial reconnaissance revealed presence of commercial-grade uranium-bearing ore.

The discovery has touched off a flurry of claim staking in the area, which is in the vicinity of Moira Sound. (See MINING WORLD, August 1955, Page 69 for details of the Ross-Adams discovery.)

New Cuban Decree Gives State Uranium Option

The right to purchase radioactive minerals found in Cuba is reserved by the Cuban government under a new Presidential decree which updates the law of 1914. The new decree stipulates that all persons mining radioactive minerals and offering them for sale must notify the Ministry of Defense in writing regarding prices and offers to purchase.

If the government does not act within 30 days after being notified, the concessionaire is free to sell to any Cuban citizen. Authorization must be received from the Defense Ministry if the sale is to be made to a foreigner.

Concessions to mine radioactive minerals are to be granted by the Ministry of Agriculture, but they must be registered with the Defense Ministry.

Nuclear Congress, Atomic Show Set for December

December 12 through 16 are the dates of the Nuclear Engineering and Science Congress and the International Atomic Exposition. To be held concurrently at the Cleveland, Ohio Public Auditorium, the Congress is being sponsored by 24 engineering societies under the leadership of the Engineers Joint Council, while the American Institute of Chemical Engineers is in charge of the Exposition. Representatives of private industry, the Atomic Energy Commission, technical societies, and universities will participate in the meetings.

Speakers at the Congress will cover Canadian, English, Australian, and South African nuclear developments for peacetime uses of atomic energy as well as United States aspects. Staff members from England's Harwell project and the Atomic Energy of Canada, Ltd. are represented in the line-up of speakers. Prominent among the 50 session topics are the "where and how" of atomic power plants with emphasis on safety and selection of site, radiation hazards and controls, atomic reactors (several models will be on display).

Uranium Miners' Groups Cover Western States

Newest of the organizations formed to represent the domestic mining industry is the American Uranium and Atomic Energy Association. Formed as a non-profit group, the AUAEA is designed to serve as a channel of service, propaganda, education, and ethics for miners, millers, investors, and industrialists. Robert J. Vallier, Sr., is chairman of the board of trustees, and headquarters are in Denver, Colorado.

Other new uranium organizations include the Montana Uranium Producers Association, which has as its purpose encouragement of uranium prospecting in the state and the establishment of uranium ore buying stations in Montana. Directors of this non-profit group are T. V. Leonard, John R. Marchi, John T. Vance, E. K. Cheadle, and Paul Dawson.

Other special uranium organizations now active in the Colorado Plateau area include the Southern Hills Uranium Ore Producers Association, Edgemont, South Dakota, president, C. W. Livingston; the Uranium Association of America, Moab, Utah, and Washington, D.C., president, Jack Turner; Uranium Ore Producers Association, Grand Junction, Colorado, president, T. H. Skidmore; Uranium Drillers Association of America, Grand Junction, Colorado, chairman, Richard Travis; United Prospectors, Inc., Los Angeles, California.

AEC Ends Secrecy On U₃O₈ Metallurgy

By SHELDON P. WIMPEN

Manager, Grand Junction, Colorado
Operations Office, United States
Atomic Energy Commission

On August 10, 1955 the United States Atomic Energy Commission announced that processes currently employed in uranium ore processing operations no longer will be regarded as classified. Uranium dissolution or extraction from ores by either carbonate or acid leaching has not been classified, but, until the present, various processes for recovering extracted uranium from solutions and slurries have been classified. Following are processes which have been declassified and which will be described below: (1) Phosphate precipitation; (2) Ion exchange; (3) Resin-in-pulp; (4) Solvent extraction.

Phosphate Precipitation—In this process, clarified solution from an acid leach of the ore is first reduced by adding metallic iron or aluminum in the form of turnings or powder. Uranium is reduced from the hexavalent to the quadravalent form. The pH is adjusted to 1.0 to 2.5 and by the presence of phosphate ions, uranium is precipitated as a uranous phosphate, U₃(PO₄)₂. Phosphate either is present in the ore or can be added, generally in the form of phosphoric acid or

monosodium phosphate. The uranous phosphate precipitate is filtered and then upgraded by repulping and agitating in a hot solution of caustic (NaOH). The caustic treatment converts the precipitate to a uranous hydrate and removes most of the alumina and other impurities. The upgraded precipitate after an additional caustic and cyanide wash to reduce base metal content, is filtered, dried and drummed for shipment to the Commission.

In processing ores with an appreciable vanadium content, some vanadium is precipitated with the uranium. If vanadium recovery is desired, the precipitate from the hot caustic treatment is filtered, partially dried, and mixed with a flux consisting of salt, soda ash, and sawdust. This mixture is fused at 900 to 950° C., cooled and water leached to dissolve the sodium vanadate which is returned to the vanadium recovery circuit. The water insoluble, fused uranium dioxide is then filtered, dried and drummed for shipment to the Commission.

Ion Exchange—Clarified pregnant acid leach solution, after pH adjustment, is brought in contact with an ion exchange material (synthetic resins) and the uranium anions are adsorbed by the material. The contact is accomplished by allowing the uranium bearing solution to

percolate through stationary beds of resin in a series of columns. The resin, in the form of small beads of uniform size, has a certain uranium loading capacity. In the exhaustion or uranium loading cycle, after a predetermined volume of solution has been fed to a column, the resin being loaded, the solution is advanced to the next column in series. The loaded resin, after a water wash, is eluted with a solution which removes the adsorbed uranium ions. The commonly employed eluting solutions or eluents are acidified nitrates or chlorides which exchange chloride or nitrate anions for the uranium anions adsorbed by the resin. The eluted resin then is ready to be put back into the circuit on the exhaustion cycle.

Uranium is recovered from the resin eluting solution by neutralization with ammonia or magnesia. In either case, sufficient ammonium ions are present so that the uranium precipitates as an ammonium diuranate. The barren elutant, after a small make-up, is ready for recycle.

Resin-In-Pulp (RIP)—This process is an adaptation of the ion exchange technique to the treatment of de-sanded acid leach slurries or pulps. Following a sand-slime separation, the minus-325-mesh slime at about 7 percent solids is fed to a resin-in-pulp adsorption unit. Adsorp-



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Chief Geologist

• "... I just returned from Colorado Plateau yesterday. I inquired about and investigated the principal makes of the scintillators and the opinion expressed by the men in the field was that electrically nothing equalled the LA ROE instruments. I am sorry that I did not order sooner but I hesitated until I had a chance to ask the men flying them . . ."

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• "... A few weeks ago I purchased a LA ROE Scintillation Detector Counter . . . incidentally, my congratulations and thanks for manufacturing what is in my belief, the best counter on the market . . ."

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tion of the uranium ions by the resin is accomplished by the pulp flowing through a series of banks in which baskets holding a known volume of resin are moved slowly up and down through the pulp. The baskets are covered with stainless steel screen on four sides and the bottom. The screen openings are large enough to allow easy passage of the pulp through the basket, yet small enough to prevent the resin from passing through and being lost. The resin-in-pulp unit is arranged so that certain banks are on the exhaustion or uranium loading cycle while other banks are on the elution cycle.

When a bank has received a predetermined volume of pulp, calculated from the uranium content of the pulp solution and the uranium loading capacity of the resin, the bank is considered saturated and is taken off exhaustion. This bank containing loaded resin is emptied of pulp, given a water wash, and then is added to the downstream end of the elution section. The eluting solution, usually ammonium nitrate and sulfuric acid, removes the adsorbed uranium and then goes to precipitation. The uranium is precipitated by neutralizing the pregnant eluate to a pH of 7.0 with magnesia or ammonia. The precipitate, ammonium diuranate, is filtered, washed, then dried for shipment. The barren filtrate is made up to strength and returned to eluant storage for recycle.

Solvent Extraction—At present there are no uranium ore processing plants using a solvent extraction process; however, recent pilot plant developments are encouraging and solvent extraction soon should find commercial application in the processing of western uranium bearing ores. Solvent extraction can be regarded as an ion exchange process in which uranium ions are removed from solution by an immiscible liquid rather than by a solid media. Several different solvent extraction processes have been developed by various Commission contractors and a discussion of each is beyond the scope of this report. Described below, however, is one of the processes which was developed for the recovery of uranium from acid leach slurries.

The acid leach slurry or pulp, either with or without the sand removed and at a high density (40 to 60 percent solids), is fed to a four-stage mixer-settler unit. In this unit, the aqueous slurry is contacted with an organic extractant at a 6 to 1 ratio. The extractant, an orthophosphate ester extended in kerosene, is very selective for uranium. The aqueous slurry flows counter-current to the organic and from the last stage settler, the slurry is transferred to a thickener to allow additional separation of entrained organic. The organic overflow returns to the circuit and the barren slurry, with a fraction of a percent organic entrainment, is tailing.

Uranium is stripped from the extractant stream with a 10 M HCl solution. The organic extractant then goes to storage for make-up and is recycled.

Because of the large volume reduction in passing from the organic extractant to the strip solution, the uranium is considerably more concentrated. Further volume reduction is effected by evaporating the strip solution. This procedure drives off the bulk of the hydrochloric acid and water, and the vapors are condensed and recycled. Ammonia and water are added to the concentrated uranium solution resulting in the precipitation of ammonium diuranate. The precipitate is filtered and heated to 600° C. to drive off ammonia and ammonium chloride.

Extensive Nuclear Reactor Programs Underway By Governments of Leading World Powers

Industrial reactor programs by the nations attending the United Nations Conference on Peaceful Uses of Atomic Energy which met at Geneva, Switzerland in August indicate that uranium mine operators will have a ready market for their product for a long time to come. Forty-two nuclear reactors are now known to be operating in 32 nations, 20 more are in the construction stage, and 22 additional units are planned. The United States is the leader in the field with 29 reactors at present; however, Great Britain, now operating five units plans 22 more. The United States has 16 in the planning stage.

In brief, developments of atomic energy reactor programs in major countries of the world are as follows:

Australia: Major portion of \$12,300,000 five-year program to be finished by the end of next year. First units will be for research and training.

Belgium: One reactor under construction; one planned. Eight leading firms have united to study and operate nuclear production facilities. Major utilities are laying groundwork for first nuclear power plant.

Canada: Two reactors operating; one under construction. Canadian General Electric Ltd. is building \$10,000,000 project. Installation at Chalk River makes 500 shipments of radioisotopes per year.

France: Two reactors in Rhone Valley under construction, one to be in full operation by next July. French Cabinet has approved \$286,000,000 nuclear program.

West Germany: One reactor in planning stage. Non-profit group formed by 16 major companies to study atomic energy research.

India: Thorium breeder reactor planned.

Italy: Test reactor planned by industry-government group.

Japan: To build reactor under U.S. "Atoms for Peace" agreement.

Netherlands: Reactor built with government of Norway has been in operation since 1951. Another one planned.

Norway: In addition to Netherlands unit, government studying ship propulsion reactors.

Soviet Union: Government reports it has atomic power plant producing 5,000 kilowatts. One additional unit known to be under construction.

Sweden: Research reactor operated by government; more advanced unit planned by semi-government organization, AB Atomenergi.

Switzerland: Reactor purchased from United States at UN Conference. Joint industry-government group to build another unit.

United Kingdom: Three reactors operating at Harwell. Power station under construction at Calder Hall. Breeder reactor scheduled for Scotland.

In addition, by the end of July the United States government's "Atoms for Peace" program was scheduled to provide low-power research reactors at half-price for 23 nations.

Important Expansions By Major Aluminum Firms

Announcement of major expansion plans by four leading aluminum producers has come simultaneously with a report by the Aluminum Association that the domestic industry is now operating at its highest daily rate in history. A record 1,519,733,010 pounds were produced in the United States during the first six months of 1955.

Reynolds Metals Company, Richmond, Virginia is beginning a \$230,000,000 program to increase its annual primary aluminum output by 270,000,000 pounds to a total of 1,100,000,000 pounds yearly. Major feature of the program will be a new 200,000,000-pound primary production plant in the Ohio River Valley in northwestern Kentucky which will cost an estimated \$168,500,000, including bauxite, power, and alumina facilities. New bauxite mines are also planned for Haiti and Jamaica, and \$30,000,000 will be spent on modernizing and enlarging present fabricating facilities.

Meanwhile, Aluminum Company of America plans to build a \$35,000,000 alumina plant near Palacios, Texas, provided the United States Corps of Engineers constructs a 30-foot navigation channel in Matagorda Bay on the Gulf of Mexico. The channel would permit ALCOA ore carriers to bring South American and Caribbean bauxite directly to the company's Point Comfort smelting plant site. ALCOA hopes to build the new plant with production starting in early 1958. The firm also has plants

at Bauxite, Arkansas; East St. Louis, Illinois; and Mobile, Alabama.

Revere Copper & Brass, Inc. New York City, has announced plans to build an aluminum reduction plant at Wenatchee, Washington designed to turn out 60,000 tons a year. Another major producer, Kaiser Company, has revealed that negotiations are under way to build a new \$60,000,000 alumina plant at New Orleans, Louisiana. The operation would have an annual capacity of 438,000 tons, and a proposed reduction plant would handle 90,000 tons per year. Kaiser already operates an alumina plant at Baton Rouge, Louisiana.

Kennecott To Build \$5 Million LPF Plant

Kennecott Copper Corporation has awarded a contract to Western Knapp Engineering Company for the construction of a \$5,000,000 leach-precipitation-flotation plant at its Hayden, Arizona concentrator. Completion date is scheduled for February 1957.

The new plant will recover an additional two pounds of copper per ton of ore treated from the Ray mine open pit. Heretofore, this copper has not been recoverable in the existing sulphide flotation plant because of the oxide coating on a portion of the sulphide copper minerals. At current Ray mine output, this extra copper recovery will be about 12 percent additional and will aggregate 5,000 annual tons of metallic copper.

The new process was developed and tested in Kennecott's Salt Lake City,

Utah Research Center under the direction of S. R. Zimmerly. Key unit in the new plant will be a Dorr FluoSolids roaster treating pyrite concentrate to yield an iron calcine and SO₂ gas. The gas will flow to a contact sulphuric acid plant. The resultant H₂SO₄ will be diluted and used to leach the oxide copper coating from the sulphides. The copper sulphides will then be floated in an alkaline circuit. Next pyrite will then be floated in a separate circuit. The acid solution containing dissolved copper will be treated with roaster calcine (iron) to precipitate copper. The precipitated sludge will be recovered with copper sulphides in the alkaline flotation section.

A somewhat similar metallurgical process is used by Anaconda Copper Mining Company on its Greater Butte ore. However, at Hayden the acid treatment will be on a much smaller sized ore particle (rod mill discharge) to obtain maximum leaching effect.

A. P. Morris is general manager of the Ray Mines Division.

Atlas Buys Half Interest In Australia Uranium Firm

Atlas Corporation has decided to exercise its option and buy a 50 percent interest in North Australian Uranium Corporation N.L. Involved are 2,250,000 shares, which represent an investment of £562,500 (\$1,265,625). Prospecting on the firm's leases in Northern Australia has outlined several promising orebodies, according to N.A.U.C. geologists.

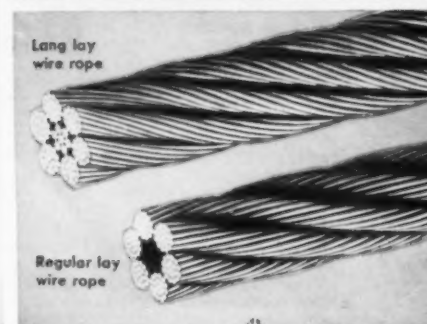
Development work will be accelerated at Sleisbeck and the South Alligator River areas, and Atlas has sent a United States uranium geologist to the operation. The Australian press has hailed the negotiation and reported that acceptance by Atlas of minority representation on the Australian company's board (four out of nine members) has created a very favorable impression in Australia.

Cerro de Pasco Announces Two New Ventures in Peru

Two expansion moves have been reported by Cerro de Pasco Corporation, Peruvian copper producer. The firm has acquired a 30 percent interest in Explosivos, S.A., recently recapitalized to engage in manufacture of industrial explosives for Peru's mining industry. Cerro de Pasco is also involved in a 40 percent participation in Refractorios Peruanos, S.A., which will operate a refractories plant at Lima for production of fireclay, silica, and basic refractories.

Harbison-Walker Refractories Company, Pittsburgh, Pennsylvania, has majority interest in the refractories plant, which is designed to supply requirements of Peruvian industry, including copper, lead, and zinc smelting. The operation is expected to mean lower metal costs for Cerro de Pasco.

Explosivos, S.A. plans to build a \$1,000,000 plant in Lima, and company spokesmen hope that the project will make Peru mining independent of industrial explosives imports. These imports exceeded \$2,000,000 in 1954. Associated with Cerro de Pasco in the new firm are Poudreries Reunies de Belgique, Belgium, and Dynamit Aktien Gesellschaft, a German company.



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Two Companies Preparing To Mine Copper And Iron in Mauritania, French West Africa

During the four-year period ending 1957, the French Government is investing over \$51,000,000 in the development of copper and iron ore deposits in Mauritania, French West Africa. Encouraged by this State intervention, two new companies have been formed to exploit the deposits.

First, the Société des Mines de Cuivre de Mauretanie (Micuma) has already started operating a pilot plant at the Akjouit copper deposit, 225 miles southeast of the Atlantic harbor of Port Etienne, which is expected to eventually produce 15,000 tons of copper a year.

Second, the Société des Mines de Fer de Mauretanie (Miferma) is preparing to develop the rich iron ore deposits near Fort Gouraud, a French Foreign Legion outpost on the frontier between Mauritania and the Spanish territory of Rio de Oro. These deposits are capable of a potential annual output of 4,000,000 tons of high-grade ore.

State capital will be allocated by the French agency known as FIDES (Fonds d'Investissement pour le Développement Economique et Sociale des Pays d'Outre-Mer). It will be used mainly for the construction of a railroad to Port Etienne and the development of water supplies.

The Micuma company has been floated with an initial capital of \$860,000, half of which was contributed by the French Government and the other half by private enterprise, mainly the Penaroya Mining & Metal Company. In addition, another \$860,000 has been put up in the form of a loan by the French Overseas Mining Bureau.

Test bores totaling 46,000 feet have been drilled into the Akjouit copper bed to ascertain the exact extent of the deposit. It is now estimated that it contains 8,000,000 tons of oxidized ore with a 2.75 percent metal content and 17,000,000 tons of sulphide ore at 1.9 percent.

Actual mining operations began this year when work was started on the sinking of two 300-foot shafts and the digging of 6,000 feet of underground galleries. A pilot plant for processing the sulphurous ore has just been put into operation. It is powered by a 750-hp Diesel-electric unit and has a capacity of 150 tons a day. Experiments in the processing of the oxidized ore are under way. So far, 200 Europeans are working on the project.

The water supply problem is acute at Akjouit. When going full blast, the mine would need 211,000 cubic feet of water a day, and adequate supplies have not yet been found in the near vicinity. The nearest known water supply is 93 miles away as the crow flies, and it would have to be pumped from the artesian well up a gradient of over 500 feet before reaching the mine. This solution would be too costly, Micuma miners say, and efforts are being made to find water nearer the mine by sinking test bores in the hope of finding another artesian layer.

Transportation is at present limited to truck convoys over desert tracks but plans are in hand for the construction of a railroad to Port Etienne. The plans are held up awaiting the results of prospecting on two more copper and one more iron ore deposits in the locality. If the newly discovered deposits prove to be

economically workable, construction will begin immediately on the railroad.

The iron ore deposits at Fort Gouraud were prospected in 1950 and 1951 by three companies: the Frobisher Company of Toronto, Canada, the British Iron and Steel Corporation (Ores) Ltd. of London, and the French Overseas Mining Bureau. These prospecting teams found a rich black ore, with a 65 percent metal content, similar to high-grade Brazilian and Swedish ores.

More recent surveys have shown that the deposits are concentrated at three points: F'Derick, Tazadit, and Rouessa, all of them in wild and desolate desert country without roads and only a scattered nomadic population. These points are only 12 miles apart and the ore is 500 feet deep, probably much more.

The Miferma company is currently cutting tracks and laying on water supplies. There is a large salt lake near the mine and beneath it there is an abundant supply of fresh water to be obtained fairly easily by pumping.

The shortest route to the sea from Fort Gouraud lies due west across Spanish Rio de Oro to the new harbor which Spain is currently building at Argub, opposite Villa Cisneros. This route is only 250 miles long but France intends nevertheless to build a 422-mile line to Port Etienne owing to the difficulty of negotiating the financial aspect of the Argub line with Spain.

The railroad to the French harbor at Port Etienne will make a junction with the proposed line from Akjouit, and it is confidently expected that the output from both mines will be sufficient to amortize its cost.

Plan Norwegian Smelter At Rodsand Ilmenite Fields

Christiania Spigerverk, second largest steel producer in Norway, is planning to develop the ilmenite deposits at Rodsand,

Sundalsfjord and is constructing a smelting plant at Svelgen, in the Bremanger branch of Nordfjord. The ilmenite is expected to yield large quantities of vanadium, titanium oxide, and a copper-cobalt-nickel concentrate, as well as increasing the company's pig iron production by more than 20,000 tons per year.

A ten-year contract for delivery of the vanadium slag has been signed with a British company and may earn the firm Kr. 20,000,000 to 25,000,000 annually.

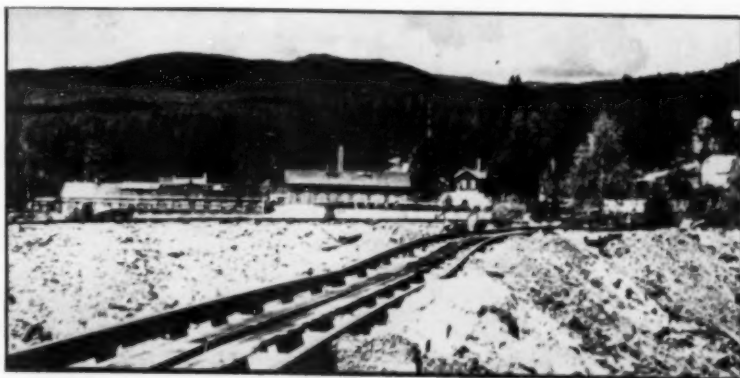
Rare Metals Builds Mill, Buying Station in Arizona

Rare Metals Corporation of El Paso, Texas, has signed a contract with the United States Atomic Energy Commission for construction of a uranium mill five miles east of Tuba City, Arizona on the Navajo Reservation. Rare Metals will treat its own ores, produced from holdings near Cameron, Arizona, and will contract for the purchase of uranium ores from other producers in the Cameron area.

The ore buying station is scheduled to open November 1 and the milling plant will be in operation by May 1 of next year. American Smelting and Refining Company will operate the ore buying station until the mill is completed; then Rare Metals will take over the entire operation.

The plant is designed to use an acid leach circuit and will employ the resin in pulp process for recovering uranium. It is estimated that the mill and station will cost approximately \$2,500,000. Stearns-Roger Manufacturing Company has been employed to design and do engineering work for the plant, but Rare Metals is doing its own construction work.

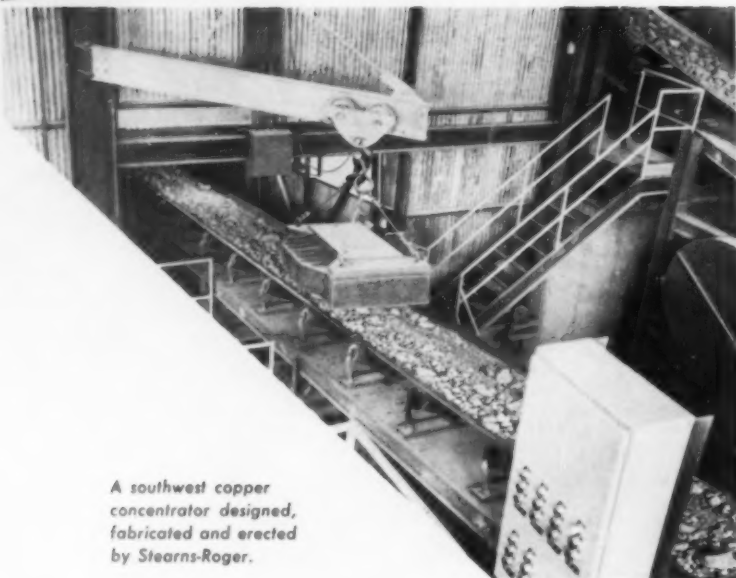
Rare Metals is a subsidiary of El Paso Natural Gas Company with headquarters in El Paso, Texas. Rocky Mountain headquarters of the firm are in Salt Lake City, Utah, where vice president M. H. Kline maintains offices.



Norwegian Silver Mine to Cease Operations

Kongsberg Solvverk, Norway's only silver mine, will close down on July 1, 1957 after 300 years of operation. Ore deposits are becoming depleted and the company has operated at a loss for several years. In 1951, the Norwegian government assigned American and Norwegian geologists to run geological and cost surveys in an effort to revive activity, and it was hoped that the devaluation of the krone would change operational deficit to profit. However, the government has finally decided that the mines, which employ 100 men, cannot be operated profitably and will close down the workings within two years.

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INDIA—The new steel plant being erected at Rourkela will be supplied with ore from deposits in Taldih, now that the *Hindustan Steel Company* has decided to mine these deposits. Investigations carried out by the Indian Bureau of Mines reportedly showed that the area contained approximately 20,000,000 tons of ore with an average content of 65 percent iron to a depth of 66 feet from the surface. Drilling now has started in the area south of this. At Rourkela the layout of Section "B" has been completed and construction of 70 houses is in progress. Many temporary structures have been completed, and wells have been sunk to supply adequate water to the project.

TURKEY—The *Eti Bank*, which operated the *Murgul* copper mine, anticipates that output for this year will be at least 26,000 tons. Production last year was 25,194 tons, with exports totaling 15,000 tons. The *Eti Bank* has also announced an increase in the price of copper to domestic buyers from 2,400 Turkish pounds to 3,100.

KOREA—The *Sam-Sung Mining Company* has fired its new blast furnace at the Changhang refinery in Chungchongnamdo. The new furnace will increase smelting capacity to 1,000 tons of copper ores and concentrates, and 1,500 tons of gold and silver ores, and concentrates monthly. Refined metal output will be valued at about 130,000,000 hwan each month, under existing smelting schedules.

INDIA—The Minister for Natural Resources has disclosed that Russian experts will help to develop the *Panna* diamond mines, under arrangement made with a private firm. A plant capable of processing 10,000 tons of diamond-bearing rock daily will be set up. Present plant capacity is 500 tons. A 50-year reserve is estimated to be in sight.

MALAYA — Undersea prospecting is being conducted along the Selangor coast for tin deposits but results have not been revealed.

PAKISTAN—Deposits of high bulk-density hematite ore of plus 60 percent iron content are reported by the Geological Survey of Pakistan. The ore occurs 15 miles from Dalbandin in Baluchistan and is reported to be low in sulphur and phosphorus.

INDIA—a group of 13 experts in mining engineering and geology have left New Delhi on the first stage of a study tour organized jointly by the *United Nations Technical Assistance Administration* and the *Economic Commission for Asia and the Far East*. The tour will take the group through parts of the USSR, the United Kingdom, France, the Federal Republic of Germany, and the German Democratic Republic to enable them to observe first hand latest developments in mining engineering and geology. Those taking part in the tour come from Afghanistan, Burma, Hong Kong, India, Indonesia, and Japan.

PAKISTAN — The *Canadian Aerial Photographic Survey Corporation*, after completion of its photographic assignment, has turned over its photographic laboratory worth Rupees 100,000 to the

Geological Survey of Pakistan as a gift. The corporation also transferred the services of its trained lab supervisor, Mohammed Saeed, to the Survey, and has ordered additional equipment which will also be presented as a gift. Results of the survey of Baluchistan have not yet been disclosed.

INDIA—The British Steel Mission reports that it is quite impressed with the advantages of Durgapur as a site for the steel plant it will erect in India. However, final recommendations will not be made until the mission has checked several other possibilities. Once the site has been selected, it is expected to take about three years before the plant will be in operation. Other plants are currently under construction by the German steel mission at Rourkela, and by the Russian mission at Bhilai.



EUROPE

POLAND—Extensive sulphur deposits have been located in the Sandomierz area, according to an announcement by the Polish government. Geologists first located traces of sulphur in the area in 1953, and early this year a team under the direction of Professor Stanislaw Pavlovski discovered the large deposit while conducting exploration work. Exploratory activities have been temporarily halted, and all efforts are now on setting up mining operations. The Polish government has indicated that it hopes to provide for all of its domestic needs with the deposit and later to ship sulphur to Great Britain, Germany, and France. The only other sulphur deposits in Poland are two smaller ones, the *Sworzowice* and the *Czarkowy*.

ITALY—A spokesman from one of Italy's leading mercury producers has dismissed the importance of the low prices offered by Mexican and Turkish producers. He said that Italian and Spanish producers have no intention of cutting prices. Both Turkey and Mexico deliver in very small quantities, and Mexican mercury is of a lower grade than is the European product, he said.

AUSTRIA—The government has announced plans to build a new flotation plant to produce 99 percent carbon-content graphite. Highest carbon content reached in Austria so far has been 92 percent. Graphite production during the first three months of 1955 totaled 5,321 metric tons, an increase of 941 tons over the same period in 1954. Seventy percent of this is being exported.

BULGARIA—The country's first lead-zinc mill is now under construction in the eastern part of the Rhodope Mountains. It will be in operation by the end of this year and will process local high-grade zinc ores.

POLAND—A new flotation plant for iron ores is now in operation at Poraj near Czestochowa, and two additional units near Sabinow and DZBOV are under construction. They will be completed by the end of 1955.

SPAIN—S.A. *Minera Celdran*, Cartagena, has been authorized to spend 300,000,000 pesetas on a modern concentration and flotation plant which will treat 40,000 tons of zinc ore annually. Concen-

trate grade will be 40 to 50 percent Zn. The installation is expected to increase Spain's ability to export zinc concentrate instead of ore as is done at present.

USSR—Estimates of non-ferrous metal output in the USSR during 1954 have been released by *The Metal Bulletin*, London technical publication, as follows (in metric tons): copper, 400,000; virgin aluminum, 355,000; lead, 275,000; zinc, 250,000; tin, 10,000; nickel, 45,000; magnesium, 50,000. The Central Board of Statistics of the USSR Council of Ministers reports that the state production plan for the first half of 1955 has been over-fulfilled for iron, manganese ore, pig iron, steel, rolled ferrous materials, and non-ferrous metals. Gross production reportedly increased over the same pe-

riod in 1954 by 12 percent. The report contained the complaint that has been noted in Russian commentary on production for more than a year—that equipment is not being used in a satisfactory way. A large quantity of equipment reportedly either is idle for long periods of time between jobs, remains inactive before being put to work, or is not installed on schedule.

POLAND—The mine of *Bialy Kamien* is now yielding ore at a rate of 70 metric tons per day. Expansion now being completed will raise this figure, but imports will still be necessary. The ore contains 99.77 percent pure pyrite.

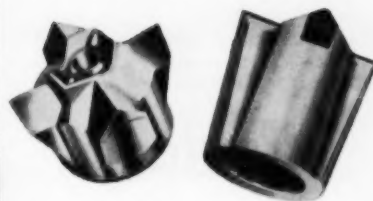
BELGIUM—Shareholders of the three Belgian steel producers—*John Cockerill*,

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Ougree Marthaye, and Ferblatit—have approved the merger of these companies. Combined steel output of the new enterprise is approximately 2,000,000 tons of crude steel annually or nearly one-half of Belgium's total production.

WEST GERMANY—Approximately 21,000 tons of manganese ore were imported from the Soviet Union during the first four months of 1955. From India 18,600 tons were imported, and 10,300 tons came from the Belgian Congo.

ITALY—Exports of quicksilver during the first four months of 1955 amounted to 11,007 flasks. Principal purchaser was West Germany with 6,708 flasks. Other buyers were France, 1,329; Great Britain, 899 flasks; Poland, 400 flasks; Czechoslovakia, 270 flasks.

WEST GERMANY—Aluminum imports from Iron Curtain countries reportedly amounted to more than 1,000,000 in the first half of 1955. Most of this was from Czechoslovakia in the form of ingots and scrap, which is in short supply in Germany at the present time. This increase in exports from the Soviet bloc lead observers to believe that aluminum production in the Iron Curtain countries has exceeded military and heavy industry needs.

POLAND—Eleven iron mines, mostly in the Leczyca district, are under development in Poland. Six of these are already producing. During the next five years 11 more mines are expected to be put into production.



LATIN AMERICA

MEXICO—The *Fresnillo Company* has taken a lease on the mining properties of *Compania Minera Suriana S.A.* located at el Cerro del Limon, municipality of Cocula, state of Guerrero. The company has completed construction of a truck road to connect the mine with the Balsas railroad station, a distance of 14 miles. Exploration work at the mine is proceeding at full capacity. Average assay of the ore is 12 percent lead, 600 grams of silver, and 20 percent iron per ton. The ore is considered to be a good flux. It will be shipped to the smelter of *Compania Metalurgica de Penoles* at Torreón, state of Coahuila. Margarito Morones, mine superintendent, states that they expect to reach high grade lead ore soon.

CUBA—A new manganese processing plant is being completed at Bahia Honda, Pinar del Rio Province, by the *Compania Minera San Vicente, S.A.* The plant, which will have a daily capacity of 200 tons, will process ore mined in the adjoining areas. New methods are to be used to separate the manganese from the high percentages of silica with which it is found. The company plans to build a new road connecting with the Bahia Honda highway to facilitate shipping of the ore. President of the San Vicente company is Churchill Blackwell, a mining engineer.

BRAZIL—*Companhia Brasileira de Alumina* has started production at its new aluminum plant, said to be the largest in South America. The new plant will produce 50,000 tons a year when completely finished. The project was financed entirely in Brazil, with 10 percent coming from the government.

BRITISH GUIANA—*Central Guiana Exploration Company* has been formed in Canada to seek diamonds in some alluvial mining concessions acquired in British Guiana. The concessions cover 10 miles on the Echibabar River, 16 miles on the Mazaruni River at the top of Pacima Falls, nine claims on the Mazaruni River below its junction with Kurupung River, six claims below and above Kamakusa, nine claims between Tobouca Falls and Kamakusa, and three claims on the Merume River. Camp buildings are being constructed on the Echibabar River, and preparations are being made for test diving operations.

PERU—*Standard Ore and Alloys Corporation* has staked a large iron ore concession consisting of approximately 2,250 acres near the harbor of Ilo, where reportedly there are several million tons of high-grade iron ore in sight. As soon as harbor facilities have been improved, additional work will be done on the property.

MEXICO—During the year ended September 30, 1954, *San Francisco Mines de Mexico* treated a record tonnage in its mill of 738,800 tons. The financial accounts of the company have not yet been published.

PERU—*Marcona Mining Company* is now shipping about 150,000 tons a month from its iron ore property, and this will probably continue for the balance of the year. For the first four months of



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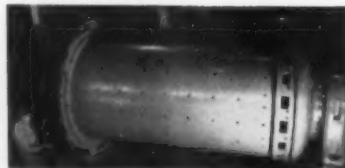
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INTERNATIONAL

1955, Marcona shipped 631,000 tons; from the start of operations in April 1953 to the end of 1954, shipments in excess of 2,800,000 tons, making total shipments for the 25-month period in excess of 3,431,000 tons. *Utah Construction Company*, a partner in Marcona, handles marketing of the ore in the United States. Principal customers are *U.S. Steel Corporation*, *Bethlehem Steel Company*, and *Eastern Gas Company*. Two trial shipments were made to Germany but nothing further was done. The Peruvian government receives a six percent royalty up to 1,000,000 tons, and seven percent on tonnage over that figure. *Cyprus Mines Corporation* is the other partner in Marcona.

CUBA—Mineral exports during the first three months of 1955 totalled \$7,250,557 in value, according to the Ministry of the Treasury. Tonnages listed, lower than in the comparative period of 1954, were as follows: manganese, 40,612; iron, 14,498; copper, 13,501; nickel, 3,267; and "other minerals," 20,041. The Ministry of Agriculture has released figures on chrome mining in the Baracoa area during May. Tonnage mined was as follows: *Potosi* mine—392 tons; *Canete* mine—237; *Cromita* mine—485; and *Delta* mine—322. In addition, the Ministry reported that *Margot* mine in Matanzas mined 36,061 metric tons of iron pyrite and exported 22,433 tons.

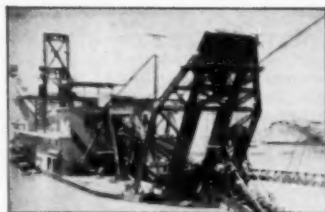
MEXICO—The Paila fluorspar district in the state of Coahuila is receiving much attention from United States companies lately. Fluorspar is a must in making aluminum, and as flux in making steel, so it is not surprising that Robert L. L'Esperance of *U.S. Steel Corporation's* exploration department, and Bruce R. Randall of the geological division of *Reynolds Metals Company*, should both be investigating this area. Reynolds Metals has actually purchased some property which has produced high grade ore in the past, but which has been shut down for a number of years. Mr. Randall is to start exploration and development of this property within the next few months. They hope to start shipping after the rainy season is over.

CUBA—The *Matahambre* copper mines in Pinar del Rio Province produced 71,486 short tons of copper ore during April and May, exporting 13,980 tons of concentrate. In the first three months of the year, the company produced 72,998 tons of ore and exported 14,604 tons of concentrate. The mines are the largest in the country and are owned by *Minas de Matahambre S.A.*

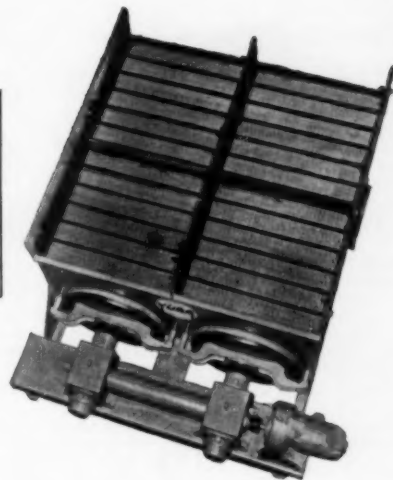


AFRICA

UNION OF SOUTH AFRICA—Discussions are taking place between the *Anglo-American Corporation* and *Vaal Reefs Exploration and Mining Company Ltd.* on the formation of a mining company to take the transfer of mineral rights over a compact block of ground consisting of the eastern portions of *Klerksdorp Townlands*, held by *Middle Witwatersrand (Western Areas) Ltd.*, and portions of farms *Zandpan 43* and *Palmietfontein 29* held by *Vaal Reefs*. The new com-



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pany will, if formed, eventually apply for a mining lease over an area of some 5,000 claims underlain by the Vaal reef, and adjoining the Stilfontein and Hartbeestfontein properties to the west, and the Vaal Reefs and Western Reefs properties to the north.

FEDERATION OF RHODESIA AND NYASALAND—Chartered Exploration Ltd., a recently registered company in which British South Africa Company and Anglo American Corporation of S.A. Ltd. are interested, will shortly initiate exploration of its three reserves extending over 104,000 square miles in Northern Rhodesia. Anglo American Corporation is the technical director of the operations; British South Africa Company owns the min-

eral rights which expire in 1986, and has granted them to the new company.

SOUTHWEST AFRICA—Recovery operations being conducted by Industrial Diamonds of S.A. (1945) Ltd. at the recently discovered diamond-bearing terrace at Saddle Hill North in the Luderitz district improved markedly in the second quarter: 6,204 loads were treated with a yield of 3,829 carats or 61.72 carats per 100 loads.

BELGIAN CONGO—For two weeks in September the railroad of the Great Lakes system in the Belgian Congo between Kindu and Albertville was closed in preparation for the opening of the Kamina-Kabalo line. This line has been

built on the standard three-foot, six inch gauge to correspond with the Katanga system which links the copper mining area with Matadi. One effect of the opening of the Kamina-Kabalo section will be that the Kivu and Northern Katanga tin mining areas will have direct access to the Atlantic at Lobito without transshipment and this should make a substantial difference to mining costs. Still more important is the effect of this new line on the traffic on Lake Tanganyika which will become accessible from the copper area. It is expected that the Kamina-Kabalo line will also diminish the reliance of the Belgian Congo traffic upon river facilities, especially for the section between Ponthierville and Kindu. Traffic, such as tin, which has previously had to move northward via Stanleyville, will now have an easier outlet southward.

TANGANYIKA—The Mbeya Exploration Company has been formed by N. V. Billiton Maatschappij in conjunction with the Colonial Development Corporation to explore and develop a pyrochlore deposit at Panda Hill in the vicinity of Mbeya. (See MINING WORLD, June 1955, page 71 for details on the Panda Hill discovery.) The company plans to set up a pilot plant to study the best means of treating the ores, and to undertake production of columbium on a fairly large scale if the research work is successful.

UNION OF SOUTH AFRICA—The Free State Saaipiaas Gold Mining Company Ltd. expects to reach production at an initial milling rate of 50,000 tons per month in about six years after the start of shaft sinking activities. Two circular vertical shafts will be sunk—one for hoisting and one for ventilation; and both will be sunk to a depth of about 6,000 feet. The Basal Reef is expected to be intersected at about 5,900 feet. Subsequent extension of mining operations laterally will, of course, require additional shafts. The total estimated tonnage of Basal Reef over the whole of the lease area is approximately 52,000,000 tons.

SIERRA LEONE—The Minister of Lands, Mines and Labor, S. Stevens, has been in London with a delegation to discuss with the Colonial Secretary the issue of licenses to African diamond diggers. The recent increase in illicit diamond mining is becoming harder to stop. Diamonds are present in all parts of the territory, and measures to stop this mining have been hindered by public opinion which has been against the monopoly agreement held by the Sierra Leone Selection Trust which only mines in certain parts of the territory although its monopoly extends to almost the entire Colony. Mr. Stevens estimates that this illicit mining accounts for about £4,000,000 annually—mostly in gem stones.

FEDERATION OF RHODESIA AND NYASALAND—Bancroft Mines Ltd. is making satisfactory progress in its development program but two factors are likely to be responsible for some difficulty in keeping to the planned timing of the future operations. The first is the poor bearing quality of the ground which has necessitated special attention to the design of plant foundations. The second factor is the presence of unconsolidated footwall beds associated with considerable volumes of water in the No. 1 shaft area which is holding up the advance of development toward the ore body. A revision of the initial development program may therefore be necessary in order to

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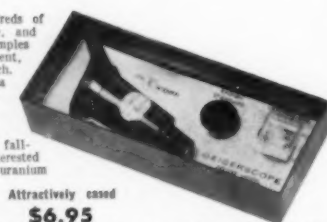
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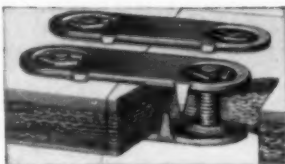
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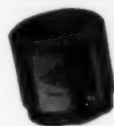


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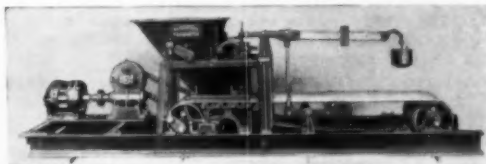
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deal with this situation and make up for any time lost. Meanwhile, additional pumping facilities are being installed but until the changeover to the 66-kv power supply has been completed this cannot be fully effective.



TASMANIA — King Island Scheelite N.L. at Grassy, King Island, treated 20,809 tons of ore in four weeks ended June 14 for a recovery of 114.4 tons of concentrate. *Moina Tungsten-Tin Mining*

Company at Moina treated 1,100 tons of ore to June 21 for an output of 12 tons of concentrate. The mine has run into financial difficulties caused by exhaustion of capital on development work. Some of the ore veins are too small to work at present metal prices. In No. 6 lode, good values of tungsten and bismuth have been found.

VICTORIA—Morning Star Gold Mines N.L. has sunk the internal inclined shaft to 260 feet below the No. 19 level. Present ore production is the lowest grade for a very long time at less than 4 dwts. Average reserves are about 14 dwts. in grade.

REPUBLIC OF THE PHILIPPINES —Copper prospects along Toledo road and in the hills of Balanban on Cebu Is-

land are being explored. These groups of claims are owned by the *Farcast Copper Mines, Cebu Copper Lode, Copper Creek Mines*, and the *Gimatagan Copper Mining Company*, all on Cebu. This mining group has already spent thousands of pesos in prospecting and exploration work. Samples are reported to assay from 2.0 to 30.0 percent copper.

INDONESIA—According to information received from the local government in the province of Kedu (Central Java), sulphur deposits in the Dieng Mountains should amount to not less than 150,000 tons. Development will be undertaken by the *N. V. Abimanyu Trading Company* from Djakarta. To start with, a sulphur plant will be installed at a cost of about 1,000,000 rupees. Daily production will be 10 tons.

REPUBLIC OF THE PHILIPPINES —General Base Metals, Inc., the country's leading manganese producer, made its fifth shipment of the year on July 12. Another was scheduled for August. The shipment consisted of 1,200 wet metric tons of 40 percent ore, destined for *Mitsubishi Shoji Kaisha Ltd.*, in Japan.

NEW CALEDONIA—Le Nickel, with nickel mines on the Thio Plateau on the east coast of New Caledonia, reports that 1956 nickel output has already virtually been sold. The company is reported to be suspending export deliveries in order to meet increased demand from French nickel users. Production is to be increased to 10,000 tons in 1955 and 1956, and to 12,000 tons in 1957. Output in 1954 was 8,400 tons.

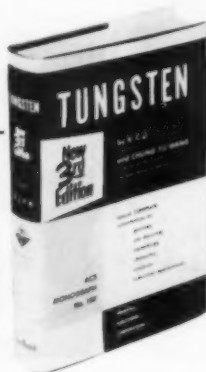
INDONESIA—Production of tin and bauxite in 1954 was as follows, reports the head of the Department of Mining, S. M. Sair: tin, 35,860 tons; bauxite, 173,239 tons. Of this output, 34,932 tons were shipped to the United States, The Netherlands, and Japan, while 246,780 tons of bauxite were shipped to Japan and West Germany. It is expected that bauxite production will increase during 1955. There is at the moment a stock of 78,000 tons. Production is estimated at 200,000 tons in 1955, with export estimated at 250,000 tons. The bauxite mines on Bintan with their modern and complete equipment have a potential production capacity far surpassing what is actually produced, according to Mr. Sair.

NEW SOUTH WALES—New England Antimony Mines N.L. at Guyra is now treating ore at a rate of 250 tons a month, for a recovery of 60 tons of concentrate. The goal is 400 tons a month, for a recovery of 120 tons of concentrate at about 60 percent Sb.

NEW CALEDONIA—Following completion of an agreement between *Broken Hill Pty. Ltd.* of Australia and *Societe Le Nickel et Etablissements Ballande* of New Caledonia providing for exports of iron ore, preparatory work has now started in the Plaine des Lacs-Bay of Prony area. Access roads to the mining area are being built and a mechanical conveyor belt system is being installed. The mine will be open pit, and first shipments are expected by the end of this year.

QUEENSLAND—Mount Isa Mines Ltd. finished the year ended June 30 with excellent production figures: blister copper 21,585 tons (an increase of 1,616 tons), and lead bullion 39,370 tons (an increase of 3,645 tons). Copper ore mined was 573,678 tons, an increase of 13,549 tons over last year, while lead ore mined

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was 670,573 tons, an increase of 33,432 tons. Zinc concentrates totaled 39,373 tons, which was a decrease of 3,645 tons from the production of the previous year.

INDONESIA—Indonesian tin ore production in March and April was 2,381 tons and 2,617 tons. This compares with Malaya and the Belgian Congo in those same months, as follows: Malaya, 5,190 and 4,874 tons; Belgian Congo 945 tons and 1,427 tons. In comparison with other tin producing countries, Indonesia is continuing to increase both its tonnage and its world percentage of tin production.

FIGI ISLANDS—Production of *Emperor Mines Ltd.* was slightly higher for the year ended June 22, 1955, compared with the previous year. In the 1954-55 period, 156,048 tons were treated for a recovery of 63,003 ounces gold, as compared with 159,572 tons treated in the 1953-54 period for recovery of 60,507 ounces. During the same period, *Loloma* produced 22,282 tons for a recovery of 10,432 ounces, as compared with 22,592 tons for a recovery of 11,462 ounces in the previous year.

NEW ZEALAND—*Arahura* dredge produced 823 ounces of bullion from 155,000 yards in 223 hours during the first half of June. In New Zealand labor and materials are becoming increasingly difficult to obtain and government controls may be intensified. The government will determine which public works must be held over for the time being. Included in the list are the Wairake heavy water plant and the important hydroelectric plant on the Waikato River.

NEW GUINEA—In three months to May 31, *Bulolo Ltd.* dredged 2,722,500 yards for a recovery of 14,373 ounces of gold. Value was 18.48 U.S. cents per yard. Dredge No. 2 was permanently closed down in April, having worked out its gravel reserves. Dredges 4, 5, and 7 continue in commission together with hydraulic mining on Widubosh leases.

NORTHERN TERRITORY—Output of *Peko (Tennant Creek) Gold Mines N.L.* was almost doubled in the four weeks ended June 29. Ore milled was 3,539 tons for 1,090 tons of concentrate valued at present Australian copper prices of £120,600. The drill core in the lead lode averaged 1.0 percent Cu and 4.7 percent Pb from 996 to 1,025 feet. There was a true width of lead lode averaging 3.5 percent over 90 feet. This is not of mineable grade.



NORTH AMERICA

ONTARIO—*Billiton Company*, a subsidiary of *N. V. Billiton Maatschappij*, has started surface prospecting and geological mapping at a base metal prospect the firm has optioned in the Tashota area. The company is actively seeking base metals in other parts of Canada, too, although the parent company has always been interested in tin.

SASKATCHEWAN—*Lorado Uranium Mines* is reported to be considering an initial minimum production rate of 500 tons, and perhaps as much as 750 tons, if developments turn out as anticipated. Drifting and drilling have started now that a sump on the third level and a loading station 110 feet below the third level have been completed. Results

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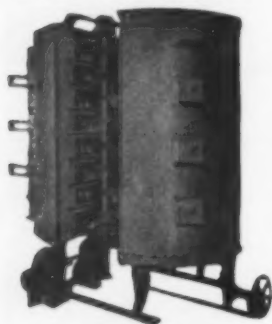
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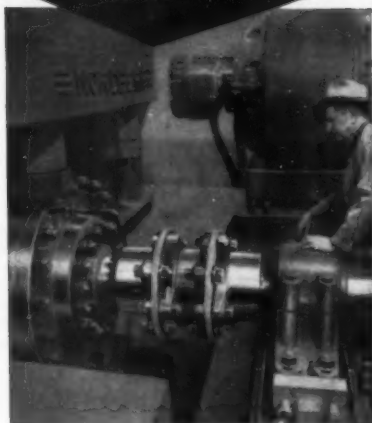
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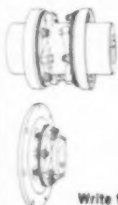
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achieved from exploration on the first
level considerably exceeded surface drill-
ing. The firm's uranium property is the
Alco group on Beaverlodge Lake.

BRITISH COLUMBIA — *Bethlehem
Copper Corporation Ltd.* has started
bulldozer stripping of the first of four
known copper-bearing zones on a 100-
claim property staked early in the year.
The property is in Highland Valley,
southeast of Ashcroft. J. A. McLallen is
chairman of the board.

QUEBEC — *Ascot Metals Corporation*
reports an average grade of 1.44 percent
lithium oxide across a width of 10 feet
and for a length of 480 feet in samples
taken along 15 trenches crossing a re-
cently discovered dike in LaMotte town-
ship. Diamond drilling is proceeding with
two machines checking the downward
extension. Bulldozing is continuing to ex-
tend the known 700-foot length of the
dike and is also attempting to locate the
unexposed wall.

ALASKA — *The United States Smelt-
ing, Refining and Mining Company* is
expanding its gold placer operations at
Nome and preparing a new dredging area
reportedly called the "submarine." This
latter area is about a mile up the beach
from Nome and about one-half mile in-
land from Norton Sound.

WASHINGTON, D. C. — *The General
Services Administration* has announced it
will cut back on its outstanding orders
for columbium-tantalum ores to make
sure it will not unduly exceed its pur-
chase quota of 15,000,000 pounds. The
cutbacks are to be across the board per-
centages and will apply to balances still
undelivered under outstanding purchase
orders. Suppliers affected are *Fansteel
Metallurgical Corporation*, *Wah Chang
Corporation*, *Kennametal Inc.*, and the
Emergency Procurement Service of the
GSA.

BRITISH COLUMBIA — *Silver Hill
Mines, Ltd.* has resumed underground
work 20 miles east of Hope. A sub-level
is being driven under an ore shoot which
yielded good silver-lead-zinc values over
a strike length of 440 feet on No. 2 level.
On the Bridge River district property,
Bralorne Mines, Ltd. has cut a station on
a new 32 level. A crosscut on the 31st
level has disclosed ore in both the "77"
and "79" veins.

ALASKA — Mining activity in the Daw-
son area is about the same as last year.
Yukon Consolidated Gold Corporation is
operating as usual. *Yukon Placer Mining
Company* is again operating on Sixty
Mile River and at Ballaret Creek where a
new jiggling process is being tried. Also
on Sixty Mile are Ledby and Lemontang;
on Adam's Gulch Cole MacFarland is at
work, and he also is opening up a new
area on Flat Creek.

NEW MEXICO — *The United States
Potash Company* plans to spend approxi-
mately \$3,000,000 to increase potash out-
put at its mine near Carlsbad, and to ex-
pand the refining facilities to provide
about 20 percent additional facilities.
U.S. Potash has also secured a large tract
of Crown land in Saskatchewan Province,
Canada, and will explore by core drilling
for potash. This is in the same vicinity
as *Potash Corporation of America*.

SASKATCHEWAN — *Nesbitt LaBine
Uranium Mines* has started shaft sinking
operations on its ABC property in the
Beaverlodge Lake area. The shaft is to
be sunk to the 960-foot horizon, with
levels at 150-foot intervals. The three-

VULCAN-DENVER in the *Philippines*

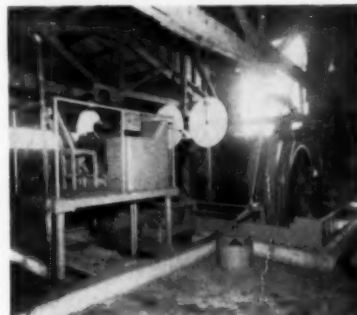
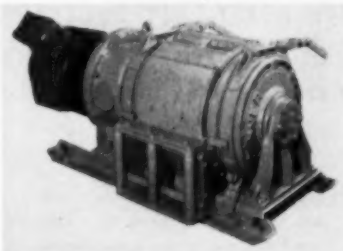


Photo shows Vulcan-Denver Double
Drum Mine Hoist, 30,000 lb. rope pull,
at the Philippine Iron Mines. This com-
pany also has a Vulcan-Denver Double
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This new heavy-duty drill, Model 106-24, is used for blast hole drilling, general exploration, foundation drilling, dewatering operations, deep post holes, etc., and is a companion drill to McCarthy 106-8 using 8" dia. augers and smaller. Has high-speed power take-off—one speed for rock, one speed for other earth formations. Outside power take-off for large augers at one-half speed. Hydraulically operated throttle valve.

AUGER DIAMETER	DEPTH OF BORE
20 INCHES	30 FEET
18 "	40-60 "
12 "	60-80 "
8 "	and under 100 "

8" diameter auger bores through shale and sandrock. Larger diameter auger bores through shale and hardpan formations. The choice of contractors where the going is tough.

* Ohio River Colliery Co., Cheshire, Ohio



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INTERNATIONAL

compartment vertical shaft is being sunk from the existing adit level.

ALASKA—The *United States Steel Company* is conducting an intensive core drilling program on property at Union Bay on the Cleveland Peninsula. Three drills are working on a two-shift basis. At Klukwan, *Klukwan Iron Ore Corporation* is diamond drilling and churn drilling.

ALASKA—*Moneta Porcupine Mines Ltd.* of Toronto is sinking a shallow adit at the *Red Top* mercury mine on Marsh Mountain near Dillingham, and plans to do 200 to 400 feet of underground work at that level. If results are satisfactory, the firm plans to drive a lower level adit and to do more extensive underground work.

QUEBEC—*Barvue Mines* plans a \$1,000,000 project which will increase profits from the company's zinc-silver ore body in the Barraute district. The plan calls for partially circling of the open pit with an inclined tunnel having a 10 percent down grade. It will go to a depth of 270 feet below the floor of the open pit, and will be used to haul mined ore in Euclid trucks. From the perimeter tunnel, crosscuts will be driven across the orebody at regular intervals from which normal stopping will be undertaken to mine out the higher grade "plums" that exist within the zone.

MANITOBA—The *Lithium Corporation of Canada* plans to start shaft sinking and underground exploration immediately on its *Irgon* claims in the Cat Lake area. The 500-foot shaft will have three levels from which to carry out lateral development work. The lithium-bearing dike explored by over 6,000 feet of diamond drilling is estimated to contain more than 1,000,000 tons grading 1.44 percent lithium oxide to a depth of 700 feet.

NEW BRUNSWICK—*Sladen (Quebec) Ltd.* has acquired about 8,000 acres in the Bathurst area, and will explore for copper and other base metals. The company has no plans for its gold property in the Malartic area of northwestern Quebec. Diamond drilling has indicated a deposit, but underground work would have to be conducted to prove this.

MANITOBA—Two lithium prospects in the Cat Lake-Bernic Lake area have been acquired by *Brilund Mines*. The holdings consist of 44 claims adjoining the main property of *Lithium Corporation of Canada* at Bernic Lake, and 18 claims adjoining *Lithium Corporation of America* at Cat Lake, 12 miles north.

BRITISH COLUMBIA—*Mogul Mining Corporation* will provide funds for the *Canam* copper property near Hope. Plans call for a mill with a capacity of 3,000 tons of ore daily. Initial funds will be about \$3,000,000.

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MINING WORLD

First in

Mining News

Atlas Consolidated

Continued from page 60

double-deck 4- by 8-foot vibrating screen. Plus-2-inch ore feeds to a 5½-foot Symons short head crusher. The minus-2-inch ore drops to the lower deck (¾-inch openings) of the screen. Oversize goes to the shorthaul, and undersize drops onto the long conveyor belt feeding the mill bins. A Merrick weightometer on this belt records ore tonnage.

Mill Recovery at Coarse Size

Metallurgically, Atlas ore is easy to treat to yield a high recovery of chalcopryrite. Metallurgist Clarence Weekley designed the flowsheet to liberate sulphides at as coarse a primary grind as possible. Accordingly, cyclonic classification in six Model D-20 Krebs cyclones is at 48-mesh; oversize is reground and undersize is sent to rougher flotation where a copper concentrate is taken out of the circuit. Rougher flotation tailing then goes to bulk flotation where a bulk concentrate is recovered, and a final mill tailing discarded. The bulk concentrate is reground, and the chalcopryrite floated from the pyrite.

Primary grinding is done in eight identical Marcy 86 ball mills, each in closed circuit with a 6- by 18-foot Dorr classifier. Overflow is 45 to 46 percent solids. The Krebs cyclones separate a flotation feed from a sand product. The overflow to flotation is around 27 to 28 percent solids with 8 to 10 percent plus-65-mesh. The sand portion (underflow) is about 50 percent plus-65-mesh and is reground in a 6-by 10-foot Allis-Chalmers ball mill in closed circuit with a 6-by 30-foot Dorr bowl classifier.

Overflow from cyclone separation of primary pulp is distributed to one of four identical flotation circuits. In each the cyclone undersize goes to a two-cell, 56-inch, Sumitomo, Fagregren-type (rougher), flotation machine. The rougher copper concentrate from four machines is then cleaned in a similar machine to yield a high-grade chalcopryrite concentrate which flows to the copper thickener. Cleaner tailing (middling) is returned to a four-way distributor.

Rougher tailing is conditioned and then flows to a six-cell, Sumitomo, Fagregren-type, flotation machine. Three cells are roughers; two are cleaners; one is a recleaner. Rougher tailing from six-cell machine is final mill tailing. Recleaner concentrate, pyrite-chalcopryrite, flows to a 60-foot bulk concentrate thickener. Thickener overflow is mill make-up water.

Underflow is pumped to an 8- by 31-foot Dorr bowl classifier in closed circuit with a 6- by 12-foot Allis-Chalmers ball mill. A Model D-20-B

Krebs cyclone is to be used in this circuit under the present expansion program to 6,000 daily tons.

Denvers Separate Cu and CuFeS₂

Classifier underflow is split to the third cell of either of two banks of eight, Mitsubishi, No. 21, Denver-type Sub-A flotation machines. A copper concentrate is floated off the first two cells and flows to the copper thickener. Bulk flotation tailing is pyrite concentrate which flows to the pyrite thickener.

A total of 33 Clarkson reagent feeders are used in the mill to feed all wet reagents.

Both pyrite and chalcopryrite are filtered on identical 14- by 18-foot Oliver drum filters. The dried concentrates drop into storage bins from which they are pulled into trucks by double-drum, electric-powered slushers.

Mitsubishi Buys Copper

Under a contract agreement with the Mitsubishi Metal Mining Company, Ltd. of Japan, Atlas was advanced \$1,100,000 to purchase mine equipment and supplies. Repayment is to be made by shipment of concentrate to Mitsubishi's Naoshima copper smelter in southern Japan. Mitsubishi will buy and smelt the concentrate and deduct \$0.03 per pound of contained copper for loan repayment.

Concentrate is trucked to the new port of Sangi on Tanon Strait built by Atlas on the west coast of Cebu. Covered storage is available for 10,000 tons of concentrate. The main feature of the port is a 650-foot rock jetty and 484-foot pier which permits loading of 10,000-ton ships drawing 32 feet of water. A reversible conveyor belt loading system is being built on the south side of the pier.

Power from Steam

Thin but fair grade beds of coal are found in the limestone (post copper) that surrounds the Toledo diorite. This coal has been mined in many places by Filipinos for a number of years. Larger and higher grade coal deposits are on nearby Negros Island. Atlas engineers calculated that steam-electric power would be cheaper than Diesel-electric because of the favorable coal supply and its low cost as purchased from local producers. Therefore, a complete power plant, used for many years at the Sado gold mine in Japan, was purchased from the Mitsubishi Metal Mining Company, Ltd. and moved to Cebu. This 4,200-kw plant was re-erected one kilometer south of the Toledo mine at a point where coal and boiler water are readily available.

Power generation has been continuous since February 16, 1955. A duplicate steam turbine and third boiler are being installed to meet requirements for additional electric power needed to increase mill capacity to 6,000 tons. Also power for the sulphuric acid plant described below will be available when the second generator is on the line.

Goal: Electrolytic Copper

Atlas is looking ahead and making plans for the future. The goals are electrolytic copper and full use of the pyrite concentrate for making sulphuric acid for sale, and for production of triple superphosphate fertilizer.

The keys to these goals are: (1) a sulphuric acid plant, and (2) cheap electric power.

The sulphuric acid plant will utilize the pyrite as a sulphur source. While a market for pyrite now exists in the Philippines, Atlas can increase its revenue by making and using sulphuric acid. Negotiations have been carried out between Atlas and Chemical Construction Company for a 120-ton per day sulphuric acid plant (including a Dorr FluoSolids roaster for burning pyrite), a 146-ton daily superphosphate plant, a 25-ton phosphoric acid plant, and a 73-ton triple superphosphate plant. These will be built on the beach at Sangi Port. Phosphate rock will be imported from the United States and unloaded over the reversed flow copper concentrate conveyor system.

With a cheap supply of sulphuric acid, the next step will be roasting of the chalcopryrite concentrate. The SO₂ gas will serve as an additional source of sulphur and the resultant oxide copper in the calcine will be leached with the sulphuric acid. The copper will then be recovered by electrolysis.

Electrolytic copper must have cheap power. That is one reason Atlas built a steam-electric generating plant and is now doubling its capacity with the installation of a duplicate generator. Today in the Philippines Diesel-electric power costs 4.0 to 5.0 cents per kilowatt hour. Atlas hopes to bring its steam-electric power cost down between 1.0 and 2.0 cents.

Atlas has pioneered large-scale mining of low-grade ore in the Orient. Atlas has proven that open-pit copper mines in the tropics can achieve medium costs. And Atlas has set the example for others to try to duplicate.

Atlas is the most important mining development in the Philippines since the end of World War II. The mining and financial world will hear much more of Atlas for a long time to come.

PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.



Big Two Axle Truck Features Short Turn Radius

Kenworth Motor Truck Corporation is now building a big new 40-ton, spring mounted dump truck which is thought to be the largest two-axle truck being produced today. The first three Kenworth 803 units have been delivered to Kaiser Steel Corporation and will be used at the Eagle Mountain mine near Indio in Southern California.

The 803 was specifically engineered for off-highway hauling jobs in open pit mining and earth moving industries. Body capacity struck is 24 cubic yards. Heaped load is 28 cubic yards; gross vehicle rating is 150,000 pounds, and the chassis weight of the Kenworth with body is 68,000 pounds.

Powered by a single Diesel engine, which will vary between 300 and 500 horsepower depending on the grades of the loaded haul, the Kenworth 803 maintains all the advantages of a two axle truck with a single drive axle, such as: shorter turning radius; less chassis weight; economy of operation and ease of maintenance. Turning radius is 36% feet, with a turning angle of 30 degrees. The new unit features power steering and a torque converter type of transmission. The hoist is a patented Kenworth three-stage, two cylinder telescopic mechanism which is single acting. For complete information circle No. 61.

New Exploration Drill Does Not Require Water

American Percussion Tool Company reports that they have developed a one-man rotary exploration drill which weighs only 125 pounds, and requires no water supply even for its power plant. It is said that the new drill can bore a 1½-inch hole through 100 feet of the most difficult type of formation. The APTCO rig can be set up in 10 minutes, and because it operates on a new principle not requiring water, the drill can be used in broken and open fissure formations which would make standard drilling economically unsound. It is powered by a 9 horsepower McCulloch gasoline engine which also drives a Sutorbilt air pump. For complete details circle No. 63.

Revised Catalog on Pulva's Equipment Now Available

Descriptions of the complete line of Pulva-Sizers, Com-Bin Feeders, and auxiliary equipment is now available in

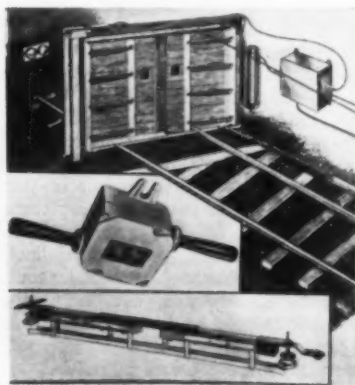
an enlarged general catalog issued by Pulva Corporation. All sections in this catalog have been expanded; that covering the Com-Bin Feeder includes additional surge capacity and dimensional data for all sizes from ½ cubic foot to 857 cubic feet capacity (units available in 6-inch increments of diameter and height). For your copy of this catalog, circle No. 78.



Wire Rope Cutting Problem Solved by Punch-Lok

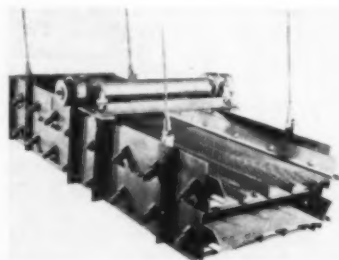
If kinks or doglegs plague you while cutting wire rope, these problems can be solved by using the Punch-Lok hose clamps manufactured by the Punch-Lok Company. This hose clamp prevents any movement of the strands during the cutting operation, and on stress-free pre-formed rope only one clamp is needed

on each side of the cut. The clamps can be removed after one cutting or left as a permanent seize if desired. Obtain more information on this quicker, tighter seize by circling No. 76.



Air Powered Ventilation Door For Trouble Spots

A new Air Power Door has been developed by the American Mine Door Company for installation in spots where a mechanically operated door is impractical. This Type P Door has been constructed for use in a watery or muddy area that would inhibit the action of a mechanical door. It can also be installed on a curve where sufficient length of straight track is not available for the mechanism required to open a mechanical door. For data on the Type P Door, circle No. 74.



Simplified Bearing Design for New Vibrating Screen

Allis Chalmers Manufacturing Company has developed a new vibrating screen, known as Aero-Vibe, which utilizes a simplified two-bearing design with counterweight wheels and sturdy bolted construction. The screen will handle a variety of material up to four inches in size, and is available in suspended or floor mounted models with one, two or three decks. Sizes are 3-by 6 to 4-by 10 feet. Circle No. 64.

NEW POWER VALVES: Instant action of remotely located or automatically operated cylinders is made possible with the new and improved power operated valves made by Ledeen Manufacturing Co., Los Angeles, California. These valves are fast cycling, have few moving parts. Circle No. 15.

FLEXIBLE COUPLINGS: Couplings made by Thomas Flexible Coupling Co. are made for a wide variety of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines except in rare instances. For more information circle No. 16.

ENGINEERED TRAMWAYS may help cut your ore transport costs and they provide an all-weather transportation system. Riblet Aerial Tramway Company of Spokane, Washington, with years of experience in tram line construction, can furnish complete information on all types and are in a position to help you with your particular problem. Circle No. 17.

SEMI-AUTOMATIC HARD FACING: Stooddy Co. has developed a new line of tubular, fabricated, alloy wires for open arc application through standard, semi-automatic welders. For more information on this high speed process circle No. 19.

SCINTILLATION COUNTER: Detetron Corp. has developed a new scintillation counter which is direct reading in percent of uranium. The DS-235 features 9 important improvements. For additional data circle No. 20.

AIR LEG DATA: Cleveland Rock Drill Division has a new bulletin available, RD-30, that describes the several types of air legs made by them. Four types are available having conventional or telescopic, 3, 4, or 5-foot feeds. Each air leg has a built-in, 11-position feed control which eliminates a third hose and cumbersome "Y" connections. For further information circle No. 21.

HEAVY DUTY DIESELS: Caterpillar Tractor Co. has developed two new Diesels, the D 342 and D 339 with rated outputs of 171 and 112 horsepower respectively. These new valve-in-head engines feature a very compact design. Circle No. 22.

AGITATORS: Denver Equipment Company bulletin A2-B4 describes Denver agitators in detail. Types developed for mixing and leaching duty can be adapted to changing ore conditions. A new model, for precipitation requirements, keeps solids suspended without undue agitation. Circle No. 23 for a copy of the bulletin.

TURBODIESEL, developed by Cummins Engine Company, harnesses the exhaust gases which are normally wasted. Turbocharging produces extra horsepower by achieving a more perfect air-fuel mixture. Three models are available with horsepower ratings of 250, 300 and 600 hp. Circle No. 24.

FACTS ON KILNS AND DRYERS: Full descriptive material on Standard Steel Corporation's rotary kilns, calciners, coolers and dryers and their many applications can be obtained from the company. Their engineering, design and laboratory departments are ready to help you with your problems. Circle No. 25.

CABLE SYSTEM DRILLING: If you are using churn drills, planning on churn drilling or interested in obtaining complete information about churn drills tools, you'll want a copy of the Spang & Company catalog. Blast hole bits, replacement blade sections, drill stems, Spang weldless jars, bailers and fishing tools are fully described. Circle No. 26 for a copy.

BETTER PAYLOAD RATIOS are possible with Lake Shore Engineering Company's Jeto bottom-dump skips and Lohed mine cars. The Jeto skip features lightweight aluminum and steel construction with fast, clean, dump action. The Lohed mine car is a durable rugged unit with rounded corners. Circle No. 27.

MOLDED BLOCK CYCLONES: Latest advance in wet cyclone design is the Type M DorrClone developed for size separation in the 10 to 20-micron range. Designated as M-30 and M-50, this new design is now available with twenty 30 mm. rubber block cyclones or ten 50 mm. cyclones in a common housing. Details are contained in bulletin No. 2504 by Door-Oliver, Inc. Circle No. 30.

SUPER ROPE: Hercules flattened strand wire rope made by Leschen Wire Rope Division of H. K. Porter Company, packs 10 per cent more steel than round strand rope. This makes the rope stronger and

safer according to the company. Sheave wear is reduced because the flattened strands offer additional bearing area. Circle No. 28.

IMPROVED SCINTILLATOR made by Precision Radiation Instruments, Inc. features a special percent meter making calibration for uranium content much easier. The new model 107 sells for \$139.50 and has been shockproofed. Circle No. 29.

NEW SPlicing TAPES designed particularly for splicing mine trailing cables and other portable cables are available from The Okonite Company, Passaic, N. J. The new tapes can be used with standard steam or electric vulcanizers. The complete line includes rubber insulation, rubber sheath and colored neoprene sheath tapes that vulcanize easily into void-free splices mechanically and electrically equal to the cable itself. Circle No. 33.

CHUTE LINING: A metal-backed rubber chute lining that can be used as a basic construction material or installed on existing or new structures has been placed on the market by Goodyear Tire & Rubber Co. Called Armaplate, the new product consists of abrasive-resistant rubber bonded to hot-rolled steel. It can be formed, sawed, sheared, rolled or punched like steel. No foreign matter can become lodged between the metal and rubber bond. Circle No. 34.

NEW SLUSHER DESIGN by Vulcan Iron Works Company meets the challenge of high stall torques according to the company. The new Vulcan-Denver slushers are built for heavy duty work with slusher motors possessing stall torques up to 625 percent of rated capacity. Clutch tracks provide for nearly complete dissipation of heat; sealed planetary housing and self energizing clutches are among other new features. Get full details in a new catalog covering the full line. Circle No. 35.

FOR URANIUM ANALYSIS the Radiac Company, Inc. offers the first professional set of calibrated radioactive constants for comparative analysis of uranium. Complete cost of the Radiassay set is \$14.95. Seven known specimens ranging from 0.10 to 1.50 percent U_3O_8 can be used with Geiger and scintillation counters to evaluate unknowns. Circle No. 36.

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SPIRALWELD PIPE: Bulletin No. 507 describes Naylor Pipe Company's lightweight Spiralweld pipe. Easy connections are made with Naylor's Wedge-Lock coupling. The pipe is available for either high or low pressure service; sizes range from 4 to 30-inches in diameter. Circle No. 31.

PORTABLE DIAMOND DRILL: A lightweight (44½-pounds), one-man drill rig that drills down to 375 feet is offered by Uranium Enterprises, Spokane, Washington. The unit is powered by a 6 or 9 horsepower motor and features a built-in water pump. For details circle No. 32.

64 QUESTIONS AND ANSWERS on Geiger counters and scintillators contains valuable information for uranium prospectors. The booklet available from Precision Radiation Instruments covers such subjects as claim staking, government bonuses, assaying of radioactive ores, and aerial or ground surveys for uranium. Circle No. 37.

NEW PRECISION INSTRUMENT announced by Mt. Sopris Instrument Corporation is their Airborne-Carborene Scintillation Counter Model SC188A. New features are synchronous logging of absolute altitude and counting rate with dual recorder; range expanding at no sacrifice in sensitivity with a zero displacement control and many others. Circle No. 38 for details.

AUGUR DRILLS: Horizontal truck-mounted and self propelled augur drills for earth and rock boring are featured in a 4-page bulletin published by the Salem Tool Company. Drills are powered by gasoline, Diesel or electric motors, and bore holes up to 12-inches in diameter to depths of 150-feet. Circle No. 39.

ROCK DRILL-BREAKER: The Pionjar portable, hand held rock drill is powered by a built-in gasoline engine. The floatless carburetor permits horizontal drilling or drilling at angles up to 45 degrees above horizontal. It's a handy machine for pioneering, prospecting and testing formations; available from Stanco Manufacturing & Sales Company. Circle No. 40.

MULTIPLIER TUBES for Geiger counters are now being manufactured by Nucleonic Company of America. They have a high sensitivity to gamma radiation, and can be attached to a low priced

counter to obtain greater sensitivities. The directional characteristic of the tube enables quick orientation to the area producing the radiation. For complete details circle No. 41.

NEW DESIGNS FOR SCREENS: Hewitt-Robins Inc. has announced the development of a new vibrating screen which they describe as of revolutionary design. A unique system of rubber and steel springs upon which the screen frames are mounted is said to offer higher screening efficiency and cut power requirement 50 to 75 percent. Sizes will be 4-by-10 to 6-by-28 feet. Circle No. 42.

RUGGED THEODOLITE: The Askania Mining Theodolite can be mounted on tripods, set up bars or timber brackets. It is particularly advantageous for work in close quarters or for mine surveys where steep sights are involved. A metal hood protects the instrument from water, dust and mechanical damage. Geo-Optic Co. of New York describes it in a 12-page bulletin. Circle No. 43.

AIRBORNE SCINTILLATION detector, made by Hycon Manufacturing Co., was designed to provide an integrated system specifically for aerial survey work. The equipment consists of a counter-control unit, a detector assembly, a terrain camera, a 4-channel recorder and an altimeter. For further information circle No. 44.

LARGEST CRAWLER: The Euclid TC-12 Twin Crawler Tractor, powered by two 194 horsepower Diesels, is described in a 4-page catalog released by Euclid Division of General Motors Corporation. Each engine operates a track. For a copy circle No. 45.

SCREENING CATALOG: The new 1955 SWECO Separator catalog features photos, drawings, and detailed specifications of equipment now successfully screening more than 241 different materials. A complete data file will accompany this catalog with information directly pertinent to the interests of each inquirer. Address requests to Catalog 112-11, Southwestern Engineering Company, 4800 South Santa Fe, Los Angeles 58, Cal. or circle No. 46.

GUNITE AND THE CEMENT GUN: The Cement Gun Company has a new bulletin available describing and illustrating the uses for "gunite." Whether you want to line tunnels or ditches, or

resurface existing concrete structures, you'll find this bulletin full of valuable information. Circle No. 47 for a copy.

WANT LONGER TIMBER LIFE? A new bulletin, available from the Osmose Wood Preserving Co. of America, Inc., tells how you can increase the life of your mine timbers and railroad ties by three to five times. According to the bulletin, Osmose salts stop rot, resist wood-destroying insects, are fire-retardant, and do not require expensive equipment or skilled labor to apply. If you use timber, you will want a copy of this bulletin. Circle No. 48.

TRANSISTORIZED GAMMA SURVEY INSTRUMENTS: Universal Atomic Corporation offer the first scientifically engineered completely transistorized gamma survey instruments. Further information and descriptive literature is available. Circle No. 49.

TOUGH CONVEYOR BELTING: The new Mainliner-Conveying conveyor belt, made by Quaker Rubber Corp., is engineered for tough jobs. Its ruggedness makes it ideal for jobs involving high tensions, high lifts and long center distances. It is steel-like in strength, practically stretchless, yet extremely flexible and troughs easily. These belts are custom made to meet your requirements, and can be made with a cover tensile strength of 3,500 to 4,000 pounds average and a friction pull of 20 to 24 pounds average. They are also available in oil-resistant Neoprene. Circle No. 50 for a copy of the free Mainliner-Conveying bulletin.

SEGREGATED BALL CHARGE: High grinding efficiency and low ball and lining wear are common to mills with a correctly segregated ball charge. The Tricone Mill, manufactured by Hardinge Co., Inc. provides these essentials to give you low cost operation without the use of special linings or internal devices. For complete details on the Tricone Mill, circle No. 51.

TAILOR-MADE DRYERS: Hardinge XH Ruggles-Coles dryers are designed to meet your job requirements. Whether you want a large or small dryer, it will pay to send for the new Hardinge dryer bulletin. Circle No. 52 for your copy.

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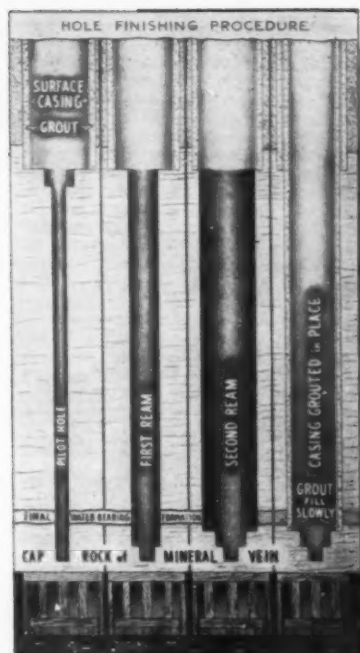
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Drill-Ream Method for Drilling Large Holes

The Drill-Ream method used for boring pilot holes for shafts, large diameter ventilation holes or cableway hole-connections to existing drifts is described in a bulletin by Spang & Company of Butler, Pa. Entitled "Churn Drill Tools for Blast Holes," the bulletin describes the all Spang blast hole tools and gives helpful hints on dressing and hardening cable tool bits. It also lists the causes and cures for battering of bits, water-course splitting, and cracking and chipping. For your copy of this informative bulletin, circle No. 62.



New Filter Bulletin Describes Many Designs

Denver Equipment Company offers an analysis of any filtration problem by their Testing Division in the new Denver

Filter Bulletin FG-81. This 16-page bulletin describes Denver Disc Filters, Drum Filters and Laboratory filters used in metallurgical and chemical industries. For your copy circle No. 67.



Two-Coil Magnetic Pulley Has Effective Flux Pattern

Stearns Magnetic, Inc. has announced a new 2-coil electro-magnetic pulley which they say removes more tramp iron than larger units on many conveyor operations. The new 2-coil design produces an effective flux pattern with a deeper magnetic field at the center of the pulley—a pattern which conforms to normal conveyor load conditions. For complete details circle No. 68.

IT'S NEW (No. CIRCLE IT



New 4-Wheel Drive Units For Severe Road Service

Napco Products Division of Napco Industries, Inc., has developed new, easily mounted, 4-wheel drive units for $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$ and 2-ton Chevrolet and GMC trucks. Known as Powr-Pak, the 4-wheel drive unit should be of considerable interest to miners and uranium prospectors who must battle mud, sand or snow-choked roads. The Powr-Pak will be distributed through Chevrolet and GMC dealers. The manufacturer states that installation of the Powr-Pak requires no frame cutting, and that it is a simple matter to remove the unit and re-install it on later model trucks. Constant-velocity joints and low friction design eliminate highway whip or weave even at high speed. For more information circle No. 69.

Notes From The Manufacturers

JAMES L. EMERSON, Chiksan Company, Brea, California, will fill the newly created post of assistant to the manager of the firm's Sales Development Department under E. N. THOMAS. Mr. Emerson will devote the major part of his time to Chiksan's advertising and sales promotion program. He was formerly advertising manager of The George S. Thompson Corporation, South Pasadena, California.



Gerald T. Raubach, Harnischfeger Corporation, was recently appointed assistant sales manager of the P&H Electric Shovel division. Mr. Raubach has been assistant manager of the service department since 1952 and before that time held various positions in electrical engineering.

Lloyd Oliver, formerly a sales engineer for the Allegheny Ludlum Steel Corporation, has been named supervisor, mining sales, of the Carmet Division. The division markets a complete line of carbide coal mining tools, including cutting and drilling bits.

Election of **Carl McFarlin, Sr.**, as an executive vice president of Merritt-Chapman & Scott Corporation, in charge of the company's Chemical, Paint & Metallurgical Division, has been announced. Mr. McFarlin is president of Tennessee Products and Chemical Corporation, Nashville, Tennessee, which was recently acquired by Merritt-Chapman through an exchange of shares.

Earl O. Heverly, formerly assistant export manager, has been named export manager of National Gypsum Company, Buffalo, New York. He succeeds **William R. Croscup**, who has been appointed assistant to the general manager of National Gypsum's Canadian subsidiary, Wesco Waterpaints Ltd., Montreal.

George H. Sherrard, Cordo Chemical Corporation, was named vice president of the Norwalk, Connecticut firm. He will continue as sales manager.

Henry R. Stoddard, Simplex Wire & Cable Company, has been transferred from the Chicago, Illinois office to the Cambridge, Massachusetts engineering staff.

Apex Marine & Equipment Company, Seattle, Washington, has been selected as Harnischfeger Corporation distributor for the Northwest area. In the Portland, Oregon region Loggers & Contractors Machinery Company will represent the firm, and Kernin Equipment Company, Roseburg, Oregon, will sell the firm's industrial units in the southern Oregon area.

Texas Instruments, Inc., geophysical leader in petroleum exploration and instrument manufacture, has opened a Los Angeles, California sales office as the first step in establishing marketing headquarters throughout the United States. Office personnel includes: **William J. Brugman**, semiconductor products division; **W. M. Montgomery, Jr.**, components division; **Rex Welch**, apparatus division.

Anaconda Aluminum Opens \$65,000,000 Plant; Full Capacity Operation Expected by January

The \$65,000,000 primary aluminum plant of Anaconda Aluminum Company, the first company to enter the aluminum field in this country since 1946, commenced operations in August at Columbia Falls, Montana. The new facility is expected to reach planned capacity rate of 120,000,000 pounds annually by January 1, 1956.

Raw material for Anaconda's plant is 120,000 tons of alumina per year. This is chemically refined bauxite mined in Jamaica, British West Indies. The alumina is shipped to Montana by rail from the Corpus Christie, Texas, and Hurricane Creek, Arkansas plants of Reynolds Aluminum Company, under a long-term purchase contract. More than 2,000 box cars per year will be required to make these shipments.

An adaptation of the plant design of the largest producer of aluminum in France, the Pechiney Company, was used for the new facility. Air contamination controls are said to be the best known in the whole industry. The French technology adopted for the Columbia Falls plant is predicted to produce aluminum at the lowest rate of kwh consumption. No industrial process water will be discharged into the Flathead River, which runs alongside the plant.

Recently completed was the "bake out" period of 12 to 14 days in the 120 pots of the first two 1,180-foot-long pot rooms. This involved passing 90,000 amperes of current from anode to cathode through the coke and pitch anodes and preformed carbon lining material. The viscous anode material was baked to become solid carbon and an electrical conductor. Next, alumina is placed in a flux of cryolite in the pots. First actual tap of the metal for casting into pigs occurred about August 15.

Each of the pots will produce from 1,400 to 1,500 pounds of aluminum in a 24-hour period. Once the plant gets into operation, the pots will be tapped every 24 hours. There are two potlines (240 pots) in the four 1,180-foot-long pot buildings. The first potline of 120 pots went into operation in August and the

second is scheduled approximately 60 days later.

Production of the new plant is expected to be divided into four categories. Harvey Machine Company of California, by a 1952 agreement, has an option to purchase a portion of the production. Anaconda's two fabricating subsidiaries, Anaconda Wire & Cable Company and The American Brass Company, will now take a part of their requirements of aluminum from this plant. A substantial portion of Columbia Falls' annual output will be sold in the open market.

The new producer is 95 percent owned by The Anaconda Company. The Harvey Machine Company of California retains a 5 percent interest in the Anaconda Aluminum Company. This relationship goes back to 1952 when Anaconda Aluminum was organized from Harvey Machine Company of Montana. The latter company had power contracts with the Bonneville Power Administration, a Certificate of Necessity, and other assets which were transferred to the Anaconda organization.

Russel B. Caples is president of Anaconda Aluminum; Robert E. Dwyer is president of The Anaconda Company.

Idaho Convention Program Emphasizes Atomic Energy

Atomic energy will highlight the program of the Idaho Mining Association when it convenes at Sun Valley on September 8 and 9.

Scheduled to address the first session are: Sheldon P. Wimpfen, manager, Grand Junction Operations Office, United States Atomic Energy Commission, who will speak on "Raw Materials for Atomic Energy"; Dr. R. L. Doan, manager, Atomic Energy Division, Phillips Petroleum Company, "Utilization of Uranium in Nuclear Reactors"; Allan C. Johnson, manager, Idaho Operations Office, U. S. Atomic Energy Commission, "The Atom in Idaho"; Tom E. Roach,

president, Idaho Power Company, "Atomic Energy for Electric Power."

The second session will shift its attention to other minerals of interest to the Idaho mining industry. Speakers are to be: Dr. J. D. Forrester, dean of School of Mines, director of the Idaho Bureau of Mines & Geology, University of Idaho, who will discuss "The Present and Future Role of Industrial Mineral Materials in Idaho"; Otto Herres, chairman, National Lead & Zinc Committee, "Western Views on the Metal Outlook"; William Gurnsey, associate director, Bureau of Land Management, "A Report on the Bureau of Land Management's Mining Activities"; E. E. Schumacher, metallurgical director, Bell Telephone Laboratories, "Communication Metallurgy"; J. L. Gillson, chief geologist, DuPont Company, Wilmington, Delaware, "Latest Developments in Ilmenite in the Titanium Industry."

President of the Idaho Mining Association is R. D. Leisk, general manager of Sunshine Mining Company. L. E. Traeger, superintendent of Productions for the Anaconda Company at Conda, Idaho, is vice president; Harry W. Marsh is secretary.



Bunker Hill & Sullivan Mining and Concentrating Company has encountered a fourth ore shoot in the West drift along the Alhambra fault on the 3,200-foot level of the Crescent mine on Big Creek, Shoshone County, Idaho. This structure was the principal ore-bearing structure in the early development of the Crescent mine, and was the source of previous production. Stanley W. McDougall is manager of mines.

Vindicator Silver-Lead Mining Company at last report was considering proposals for deepening its 800-foot shaft east of Mullan, Shoshone County, Idaho, and carrying on exploration work. Discussions also have been held with respect to consolidation, development, and operations of properties to the north through the Vindicator shaft. A settlement has been made with Day Mines, Inc., regarding ownership interests in the Bull Dog patented claim adjoining Vindicator ground on the north. About \$210,000 has been spent at the property in the last two years under an operating agreement with Silver Buckle Mining Company and a DMEA exploration loan. The shaft was sunk and nearly 1,300 feet of lateral work done to explore a mineralized structure. W. J. Logus of Seattle is Vindicator president.

Metropolitan Mines Corporation has completed rehabilitation of the main adit at the Black Bear Silver-Lead Mines' property north of Wallace, Shoshone County, Idaho. It also has completed surface plant improvements and added to its development crew. A 300-foot raise and a 600-foot raise are planned to reach unmined ground above old stopes. At Metropolitan's silver property west of Wallace, Sunshine Mining Company has resumed development work on the 3,700-foot level.



Aerial view of the nation's newest primary aluminum producer

Calvin and Henry Dworshak, sons of Senator Henry C. Dworshak (R-Idaho), and Joseph M. Imhoff Jr. of Boise have incorporated *Georgia-Idaho Company*, a mining firm, and capitalized it at \$25,000.

Bert Sweet Jr. of Twin Falls, Idaho, has discovered uranium-bearing veins on the north fork of the Big Lost River in southern Idaho.

Salmon Uranium and Thorium Co., Inc. of Mackay, Idaho has been organized to explore and develop more than 250 mining claims containing uranium, thorium, tungsten, silver, manganese, copper, and other minerals. Clinton Gunderson is president; J. H. Stocks, vice president; and Kenneth Deming, secretary-treasurer. All are Mackay residents.

Uranium prospectors have filed additional claims in Idaho County. Philip and Clyde Jungert and James Aram, all Lewiston, added several to 40 previously filed along the Big Salmon River from south of Riggins to French Creek. R. G. Peterson and H. M. Curtis, Lewiston, filed the *Lucky Lode* in the French Creek area. James W. Hart filed on the *Margaret* group along the Southfork. Melvin, Richard, and Glenn Gribble filed the *Bonnie Blue* in the Elk City mining district near the Southfork. Dean Brady, Ray Sarbacher, Harry Woodward, Tony and Lawrence Wassmuth recorded the *Lucky Five* in the Ten Mile district adjacent to the Southfork. William C. York, Dwyer Best, Elmer G. York, and Glen Landreth filed on the *Buffalo Diggins* group one mile west of Elk City; Walter S. Campbell and Winifred Campbell filed the *Lucky Win* claims in the Ten Mile district. Clair Johnson located the *Noise Rock* claim near American River and *Box Springs* in the Elk City mining district.

WASHINGTON

Tungsten Uranium Mines, Inc. has resumed production of tungsten concentrates at the old *Germania* mine and mill just north of the Spokane Indian Reservation, Southwestern Stevens County, Washington. At last report, the mill was handling about 80 tons of ore daily. Mill improvements were made following a winter shutdown. The firm also was bulldozing a new autinite discovery leased from Arthur Selleck in the Mount Spokane district, Spokane County. R. H. Svendsen is engineer in charge. Wellman Clark is company secretary.

Deepening two barren bulldozer cuts 18 inches to a depth of about 5½ feet uncovered high-grade green autinite ore at the property of *Daybreak Uranium, Inc.*, Mount Spokane district, Washington. The ore, occurring in veinlets up to two inches in width, was found in leveling operations for start of stockpiling production from the original surface showing in preparation for initial shipments under AEC contract. Ore zones also have been found in drill holes 5, 6 and 7. Kae Sowers, Opportunity, is secretary-treasurer.

In northern Ferry County, *Sherman Creek Uranium Mines* has moved diamond drilling equipment onto its property near the summit of Sherman Creek pass; *Faith Mines* has moved equipment into the Granite Creek region and opened an office in Republic, Washington.

Grandview mine and mill operations, halted by a fire which destroyed a compressor house, were resumed with aid of portable compressors. The blaze started in an oil switch weakened when lightning struck near the building. John W. Currie is general superintendent of the *American Zinc, Lead and Smelting Company* operation near Metaline Falls, Pend Oreille County, Washington.

Mineral rights on 120 acres of allotted Spokane Indian reservation land adjoining the *Midnite* uranium mine brought a high bid of \$167,850 at a bid opening at the Colville Indian agency, Nespelem, Washington. George B. Guilloite, who came to Spokane as a consulting engineer for *Continental Uranium Corporation*, Chicago, was high bidder. Other bids

were L. B. Signan, Yakima, \$87,100; *Newmont Exploration, Ltd.*, New York, \$67,000, and *Phelps Dodge Corporation*, Douglas, Ariz., \$10,104. *Newmont* now is operating the *Midnite* mine through a subsidiary, *Dawn Mining Company*.

Day Mines Inc. of Wallac, Idaho has started development of some uranium deposits in the new Kettle Falls district of Ferry County, Washington. The company took over eight mining claims, and 120 acres of adjoining land, from Newland and Sullivan under a 25-year profit sharing lease which may be extended an additional 25 years. The potential of this property can be ascertained without too much expense.

Continental Uranium, together with *Minerals Engineering Company*, will drill

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NORTHWEST

and explore four tracts totaling 459.42 acres on the Spokane Indian Reservation in Stevens County, Washington.

Western Gold Mines, Inc. is installing a Diesel electric power plant and other equipment expected to increase milling capacity from 150-200 tons daily to 500-600 tons. Installation was delayed by an accident and a cloudburst. A truck-trailer carrying the 30-ton plant into the property in the Cascades from Winthrop, Okanogan County, Washington, went over an embankment after hitting a soft shoulder on the mine access road. A cloudburst then washed out the road to the scene. Road repairs had to be made before salvage equipment could get in. Harry Kramer, Seattle, is company president.

MONTANA

Ore production from the 1,300 level of the *Anaconda Company's Kelley* mine at Butte, Montana got under way early in August. This level has been under intermittent development since the start of the Greater Butte Project, but until now all ore had been mined from four zones on the 600 level. The method of mining used on the new lower level will be block caving and mine cars will be loaded from slusher drifts rather than using the gravity draw system which was first em-

ployed on the 600 level. The scraper loading system from concreted scam drifts has proved quite successful in reducing repair costs in several of the later blocks mined on the 600 level.

Montana Phosphate Products at Garrison, Montana has called for bids for the construction of a pumice block compressor building and dry to service the proposed new haulage tunnel on the 4600 level. A 4½-mile spur railroad line to the site of the portal of this adit has been completed.

Fred Platt of Billings, Montana and associates are doing some exploration work on the old *Blacksmith* mine near Hassel. A promising outcrop of gold ore has been stripped clear of overburden in several spots and plans are being made to test the vein at a shallow depth.

The *Pony Tungsten Enterprise Company* has done considerable development work on the second level of the old *Strauberry* mine near Pony, Montana, and some stopes are being readied for production. The ore is ground in an old stamp mill and concentration is done on tables.

Anaconda Company's Kelley No. 2 shaft will be raised from the 3,000 level of the *Stewart* mine to make a connection with the present shaft which now bottoms on the 2400 level.

OREGON

A uranium strike has been made in southeastern Oregon by Harold Davis, Milwaukie, Oregon, former merchant seaman, and Dewey Quier, Burns, Oregon. They located the radioactive ore on Pike Creek, 50 miles north of the Nevada border, following a four-month search. A spectroscopist with the state department of geology and mineral industries called it "the best uranium prospect discovered in Oregon so far."

An even better strike was promptly claimed by John Roush, rancher, in timbered mountain country nine miles northwest of the south-central Oregon town of Lakeview. He said he and his associates have staked 16 claims and stockpiled nine tons of ore.

The U.S. Bureau of Mines is reported to have confirmed the presence of uranium at the *White King* and *Lucky Lass* mines. Average content at the *White King* reportedly was 0.66 percent U₃O₈ with selected samples assaying 1.4 percent. Robert Adams, Jr., one of four partners in the *Lucky Lass*, reports that their mine samples assayed 1.2 percent at the Albany Bureau of Mines office. *Rare Metals Corporation of America* has geologists in the Lakeview area sampling some of the more promising mines.

A scheelite prospect is being investigated by Anthony Brandenthaler of Baker, Oregon. Lester E. Thornton discovered the occurrence last year and developed it by a 60-foot adit and surface pit. Bulldozer trenching will be undertaken this season to explore the lateral expansion of the adit showing.

Leslie and Chester Kribs of Prineville, Oregon have filed claims covering the *L C Mines* No. 1, 2, and 3, located in the Green Mountain mining district on the McKay Creek north of Prineville.

MINING WORLD



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DuPont Acquires More Florida Acreage To Substantially Increase Ilmenite Holdings

The rich ilmenite area near Camp Blanding, Florida has been leased by E. I. DuPont de Nemours and Company who was high bidder on the land. Acquisition of this region increases DuPont's leased holdings from 7,000 acres to 18,000 acres, and increases the firm's royalty payments from 30 cents to 65 cents per gross ton of mineral. The royalty paid must be split between the federal and state governments since each owns part of the land.

The new agreement extends the mining area which parallels the Bradford-Clay county line, from Highland on the north almost to Keystone Heights on the south. DuPont has been mining in the region since 1949. It had acquired leased mineral rights to 3,800 acres southeast of Starke in 1947, and in 1949 it developed the Trail Ridge mine, operated by Hum-

zircon, and 22,754 tons of staurolite from the Trail Ridge plant alone.

American Zinc Acquires Two Wisconsin Properties

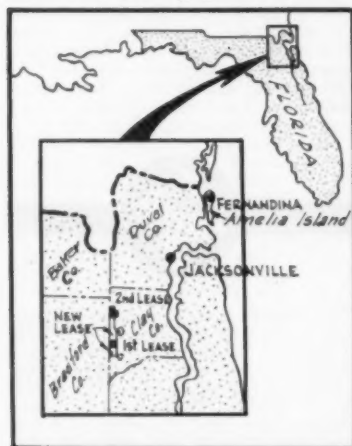
American Zinc, Lead and Smelting Company has acquired several properties in Wisconsin upon which it had been drilling for several months. The combined properties should, under present market conditions, produce from 18,000 tons to 25,000 tons of combined lead-zinc concentrate a year.

The first acquired was the Cuba City Mining Company's lease on the Thompson and the Temperly properties comprising 370 acres in the southern Wisconsin mining area on which a substantial tonnage of zinc ore had been proven. Development work has started and the mine is expected to go into production during the second quarter of 1956, at a rate of 12,000 tons annually of 60 percent zinc concentrate.

The company also acquired the milling facilities, mining leases, and equipment of Vinegar Hill Zinc Company in southern Wisconsin. Principal owner was the Youngstown Sheet and Tube Company of Youngstown, Ohio. Ore on this property together with that of the Cuba City property and other sources, will supply the mill capacity for a period of from six to eight years.

First production from the new Young mine at South Friends Station in Tennessee started at the end of July. This will be gradually increased so that by the end of October the firm expects to reach a single-shift capacity of 1,000 tons of ore per day.

Prospect drilling in the southwest New Market, Tennessee area continues to show favorable results.



Place-fix map of titanium activity in Florida

phreys Gold Corporation for DuPont. Later DuPont acquired 3,200 acres near Highland where it developed the Highland plant. The new area closes the gap between the two properties.

National Lead Company and Bear Creek Mining Company, exploration subsidiary for Kennecott Copper Corporation, were the other bidders. National Lead purchased a large tract in Bradford County covering 1,816 acres earlier this year. The land is situated between Duval, Baker, Bradford, and Clay counties. (See MINING WORLD, April 1955, page 81). Bear Creek has conducted geological surveys in Bradford, Clay, and Duval counties since 1954.

Interest in the titanium-bearing minerals of the state continues high. Union Carbide and Carbon Corporation reportedly has a crew in the field sampling beach sands on Amelia Island near Fernandina, in the northernmost part of the state.

DuPont reportedly has indicated that it will move its Highland mining barge into the new area later this year. Once full operation is underway, production is expected to yield 100,000 tons of ilmenite, 60,000 tons of zircon and staurolite, and 30,000 tons of mixed concentrates annually. There are indications that DuPont has been producing annually about 101,500 tons of ilmenite, 9,468 tons of

Heavy Media, and cyclone plant at the Parcel 3 property located near Coleraine, Minnesota. Some of the existing facilities of the Buckeye mine which was closed in 1954 after depletion of the ore body will be used.

The E. W. Coons Company resumed operations at the Commodore iron ore mine at Virginia, Minnesota this season, preparatory to resuming shipments from the property. The Commodore is one of the oldest mines on the Mesabi Range, and has made intermittent shipments since 1893.

The screening plant at M. A. Hanna Company's Weggum mine has been moved to a higher location on order to release ore in the south side of the open pit. The job involved a complete change in the conveyor system.

Great Lakes ore carriers transported about 8,000,000 tons more in the first four months of the 1955 ore shipping season than in the same period of 1954. The 1955 total of iron ore transported during April, May, June, and July was 41,464,023 tons, compared with 33,258,765 tons in the same period of 1954. The July total alone was 13,334,308 tons, which is 2,318,000 tons over the 1954 figure and only 1,100,000 under the July 1953 peak figure.

The Jessie mine northeast of Grand Rapids, Minnesota is operating on a limited scale this year. Shipments were resumed in June for the first time since 1953. The washing plant at the mine is also in operation. The mine is owned and operated by the Jessie H. Mining Company of Crosby, Minnesota, with L. R. Sewell as superintendent of the property.



Inland Steel Company is exploring for iron ore deposits on some newly acquired land in Ashland County, Wisconsin which it leased from the Hines Lumber Company. The drilling program is expected to take about two years.

Several new plants are scheduled for construction on the Mesabi Range this winter. The W. S. Moore Company plans to dismantle the present plant at the Prindle mine and rebuild it at the Marisca. Additional Remer jigs and a primary crushing section will be added. W. S. Moore also plans to build a complete crushing, screening, washing, Heavy Media, Remer jig, and Humphreys spiral plant at the O'Brien mine. Scheduled to go into operation in 1956, it will be located between Nashauk and Keewatin on the Mesabi. Cleveland-Cliffs Iron Company will add a 160-long-tons-per-hour cyclone plant to the existing Holman Cliffs Heavy Media plant. M. A. Hanna Company will install a complete crushing, screening, washing,

The United States Atomic Energy Commission has disclosed that it will erect a \$10,000,000 building at Germantown, Maryland which will be its permanent headquarters. Work is to begin early next year after a low bidder has been selected, and it is to be completed in late 1957. Present plans call for a three-story reinforced concrete building on about 50 acres of ground.

The Fourth National Clay Conference, sponsored by the Clay Minerals Committee of the National Research Council, will be held at the Pennsylvania State University October 10 through 13. A number of prominent scientists from abroad have been invited to attend and to present reports on the status of clay mineral investigation in their respective countries.

The National First Aid and Mine Rescue Contest, sponsored by the United States Bureau of Mines, will be held in Knoxville, Tennessee on October 10, 11, and 12. First Aid, Mine Rescue, and combination First Aid-Mine Rescue teams from all mineral industries, including coal, metal and non-metal mines, petroleum fields, and refineries, mills, smelters, and quarries from all sections of the United States will com-

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CENTRAL AND EASTERN

pete as a part of this accident prevention program.

The General Services Administration has returned to its former policy in the buying of hand-cobbed mica at \$600 a short ton causing much upheaval in the mica mining industry. Since February 1955 the United States Government Depot in Spruce Pine, North Carolina has been purchasing mica at much more than \$600 a short ton, depending on the amount of acceptable mica in each lot. The average price was more than \$1,000 a short ton. On the basis of this more liberal price, old mines were reopened, and several new mines were started. The order to revert to \$600 regardless of whether the minimum content of acceptable mica is exceeded came with only five days notice. As a result many miners are in serious financial difficulty. The change also means that the industry must return to the "A" program, under which the miner prepares his own mica in the final form acceptable to the government. Since April the miners have been operating on the "B" program where the government did all of the processing. The Spruce Pine depot has hired most of the rifters, trimmers, and sheeters in the area, who will now probably return to their former employers.



Calumet & Hecla's submersible pumps used to unwater the huge Osceola Lode at Calumet, Michigan were rushed into emergency operation at Inland Steel Company's Sherwood iron mine at Iron River recently. The water had been building up behind an underground dam separating the Cleveland-Cliffs Iron Company's Spies shaft from the Sherwood. Inland officials asked for help when the water began rising in the Sherwood, eventually reaching a point more than 10 feet above the present working level.

The University of Minnesota will present its fourth annual Drilling Symposium on October 13, 14, and 15 at the Center for Continuation Study on the Minneapolis campus. The use of tungsten carbide in rotary exploration drilling will be the principal subject.

The Plaza Mineral Exploring Company has been incorporated at Plaza, North Dakota to mine uranium, thorium, or any other fissionable and radioactive materials. Directors include H. L. Grasmoen, Juel Sjol, H. L. Salvig, and Orville Reum of Plaza, and Q. R. Schulte of Stanley.

Two new firms have been incorporated in Clintonville, Wisconsin. B & B Oil & Uranium Corporation has been formed by William R. Schuster; and Wisconsin Uranium Corporation has been formed by Reuben E. Tews.

The second alumni reunion of the Minnesota School of Mines and Metallurgy will be held October 21, 1955. A technical session is scheduled during the day at the school, and banquet and dance will be held that evening. Contact R. L. Dowdell, 306 Appleby Hall, Minneapolis 14, for reservations.

—precipitates—SOUTHWEST

New Mexico Convention Set for Sept. 29-Oct. 1

The International Mining Days and the annual meeting of the New Mexico Mining Association will be held in El Paso, Texas on September 29, 30 and October 1. An outstanding group of well known, highly qualified specialists in general mining geology, core drilling, ventilation of hot mines, ore dressing, copper leaching and electrolytic deposition of copper, uranium mining and milling, and portable water supply have already been scheduled for the technical sessions. The AIME Banquet, Ranchero Breakfast, and Suppliers' Party are among the entertainment features. O. Paul Lance at 310 San Francisco Street, El Paso is chairman of the event.

Western States To Hold Mineral Policies Meeting

The Western Governors Mineral Policies Conference will be held in Sacramento, California, November 7 and 8. S. H. Williston, chairman of the Western Governors' Mineral Advisory Council, and DeWitt Nelson, California State Director of Natural Resources, are co-chairmen for the event, which is expected to draw delegates from the eleven Western States, plus Alaska and South Dakota.

Definite policy recommendations are expected to come out of the conference, which is designed to analyze the problems involved in creating and maintaining a healthy domestic mining industry. The recommendations will be made to the permanent Western Governors Mineral Advisory Council which meets immediately after the conference.

One California man and one co-chairman from another state are being named to head the five Policy Committee Panels. California chairmen have already been selected. They are Arthur H. Kent, San Francisco, Taxes; P. R. Bradley, Jr., Pacific Mining Company, Lands & Water; Tom Lyon, San Diego, Mineral Economics; Dr. Ian Campbell, California Institute of Technology, Research; Ray B. Wisner, Walkeng Mining Company, Public Information.

Honorary chairman of the conference is California Governor Goodwin J. Knight, who recommended the meeting after a series of communications with Charles H. Russell, governor of Nevada.

Bear Creek Explores Twin Buttes Area of Arizona

Bear Creek Mining Company has an exploration crew making geophysical surveys in the Twin Buttes area of southern Arizona. The area being investigated is southeast of both the Banner Mining Company and the Pima Mining Company where extensive deposits of copper have been developed. Banner is operating its 500-ton-per-day flotation concentrator and Pima is maintaining a small development crew while Cyprus Mines Corporation has a purchase option in effect.

The Bear Creek geologists and geophysicists are making seismograph (reflection) surveys on a broad alluvium covered desert area. Depth to bedrock, configuration of bedrock, and changes in bedrock structure and rock types are among the items Bear Creek is interested

in determining. It will be recalled that Pima is a geophysical discovery through about 200 feet of dirt, boulders, sand and gravel.

Bear Creek is the exploration subsidiary of Kennecott Copper Corporation and is headed by Dr. James Boyd who headquarters in New York.



Preparations for large-scale manganese mining are being made by Al Stovall of Phoenix, Arizona, on claims leased from the Fort Apache Tribal Council. The property, known as the *Stovall-Apache* manganese mine, is located at Gleason Flats on the Salt River, 32 miles north of Globe. Heavy equipment is stripping the overburden and moving ore about two miles for stockpiling at the mill site. About 700 tons of ore, from the east side of the mine, are being moved daily, and a stockpile of over 20,000 tons has been accumulated. A camp of 13 trailers has been set up at the mill site for workers and their families. In the meantime, a 500-ton portable milling plant is being constructed in Phoenix and when completed will be taken to the mine. Mr. Stovall hopes to be shipping concentrates under the government's carload program by October 1. About 30 men will be employed. Orville K. Mills is general superintendent in charge of operations; Kenneth Short in charge of mining; and Virgil Short, supervising milling.

White Canyon Mining Company of Dove Creek, Colorado has purchased several manganese properties in the Artillery Peak district of western Arizona, along with several leases and a 500-ton-per-day mill. The company has now completed a 1,000-ton heavy media mill which is producing concentrates that qualify for the government's manganese purchase program.

The 500-foot smokestack for the *San Manuel Copper Corporation's* smelter at San Manuel, Arizona, has been completed. According to San Manuel officials, all work at both the mine and plant is ahead of the original schedule and completion of construction is expected in December of this year. A recent contract was awarded to *Hewitt-Robins, Inc.* for two miles of conveyor belting and machinery components. At present the town of San Manuel has a population of approximately 1,400, with 380 of the 1,000 houses occupied.

Miami Copper Company reports that while its uranium exploration activities in Arizona have not developed anything of commercial value, the company is taking out ore of a shipping grade in one place. However, it is presently inaccessible without any roads, and no road will be built until the firm is certain that sufficient ore is present to make the deposit economically feasible.



Plans are being made to operate the borax mine near Boron, California belonging to the estate of the late Harvey S. Mudd. The mine will be operated under a new company name, according to K. C. Richmond, general superintendent of the *Coronado Copper and Zinc Company*. The property has already been improved by the addition of a testing laboratory, machine shop, blacksmith shop, and housing facilities for employees. Additional installations are to be completed shortly.

Verdi Development Company hopes to have its reconverted uranium mill in operation by the end of this month. The company expects to have about 6,000 tons of ore stockpiled by that time. The company has been reconvertng the Beck gold mill to a uranium milling and leaching plant with a capacity of about 50

First Mother Lode Generator Goes to Museum

A 15-ton generator and pelton wheel used in the 1890's by the *Utica Mining Company* has been added to the museum in Angels Camp, California. It was placed in position at the museum by a crew of volunteer workers with the help of a giant crane borrowed from the nearby *Calaveras Cement Company* plant at San Andreas. The generator was the first to be installed in the Mother Lode district. It was hauled by 18-mule team to the site of the *Utica* mine above the town of *Murphy's* in 1895. The equipment consisted of one 500-kilowatt, 500-volt, 2-phase generator and the pelton wheel. In 1940 the *Utica Mining Company* separated its power and water properties from the mining enterprise, establishing the *Utica Power Company*. The *Utica* power properties were acquired by *Pacific Gas & Electric Company* in 1946, and the old plant subsequently was replaced with an automatic unit of 3,800-kilowatt capacity. The Mother Lode district has been one of the most productive of the gold lode mining districts in the state. The Mother Lode belt is 120 miles long and its gold-bearing veins are in slate, greenstone, and schist of Jurassic and Paleozoic ages, within or near a system of reverse faults. Extending from northern El Dorado County, southeast to Mariposa in Mariposa County, the district includes more than 40 important old mines.



SOUTHWEST

tons a day. Verdi presently is developing about 2,200 acres of claims near Rosamond, California. The mill is four miles south of Mojave.

Gold Shares, Inc. has a 50-ton mill under construction in the California Hot Springs area near Porterville. The mill was designed by MacAfee & Company, consulting engineers and metallurgists of Los Angeles. The crushing section is designed for 100 tons, allowing for expansion of another 50 tons if development merits it. Completion of the mill is expected shortly, with milling of high-grade scheelite ore to start immediately thereafter. The firm leases a 1,700-acre property formerly known as the Tyler Ranch. Three zones of tungsten-bearing tuffite

are being developed on the property, and four faces have been prepared for open-pit mining. Preparations are also being made for underground work.

Recently completed and starting production was the \$125,000 plant of *Darmond Mining and Smelting Company* at Rosamond, California where germanium, gallium, zinc, cadmium, mercury, and arsenic will be refined at the rate of 10 tons daily. The company owns a mine at Darwin which will supply the ore. The *J. H. Thompson Company* has opened up a new lead smelting plant, also at Rosamond, where lead will be recovered from old batteries and other waste lead products.

The *Palo Alto Mining Corporation* of San Jose, California is reported to be mining quicksilver ore from the *Chaboya* mine, located 1½ miles from the company's chrome mill. Old tailings and screenings are being treated, while the mine is being converted from underground to open pit. Three furnaces, designed by company general manager George Carlson, have been installed.

The *Tropico* gold mine is still in operation southwest of Rosamond, California. Its mill is reported to be the only one in southern California from which gold is still shipped for processing. Owned by Alice E. Burton, Dorene Settle, Clifford G. Burton, Glen Settle, Leona V. Burton, and Vivian Dixon, they also have leased the nearby *Cactus Queen* mine. Three shafts and more than six miles of tunnel have been driven in the property. The ore is crushed and fed to a ball mill, where a cyanide solution is added. Recently a flotation section has been incorporated.



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The *Terlingua Mercury Corporation* has completed the first furnace run of ore from its newly discovered high-grade ore body in the Terlingua district of Brewster County, Texas. From 24 tons of high-grade ore combined with about six tons of low-grade fluxing ore, 569 pounds of mercury were produced, or almost eight flasks. Based on this recovery it appears that the new discovery in the *Fresno* mine will average two percent or 40 pounds of mercury per ton. Extent of the discovery is not yet known.

Lone Star Mercury, Inc. is reported to have discovered a rich cinnabar ore deposit in its *Maggie* mine in the Terlingua district of Brewster County, Texas. About 100 tons of ore have been stockpiled. Before operations can continue, a proper shaft must be sunk; the present shaft is only a "hole in the ground" about 60 to 70 feet deep. A modified Gould furnace has been installed and is in operation. Two additional furnaces will be installed if sufficient ore is located. Present output is about 12 to 15 flasks of mercury daily. Principal owners of the firm are Skubic Brothers who have iron mines on the Mesabi Range near Virginia, Minnesota, and H. P. Reynolds, a Chicago attorney. The company will open an office in Alpine if it gets FCC approval for a two-way radio. Otherwise the office will be located at the mine. Present headquarters are in Dallas. Roy Brown who discovered the cinnabar ore body is mine superintendent.



Farmers Chemical Resources Development Corporation has called for bids on the sinking of its new shaft to a depth of 1,600 feet. Work is to start shortly.

The corporation was formed by Kerr-McGee Oil Industries, Inc., National Farmers Union, and Phillips Chemical Company to develop 13,000 acres of potash land in Eddy and Lea counties, New Mexico.

Victory Exploration and Mining Company has purchased what amounts to a one-fifth interest in the Hofheim mining properties near Bland, New Mexico, a ghost town in the Jemez Mountains 50 miles northwest of Albuquerque. C. H. Hibbler, president of Victory, says that gold and silver deposits have been blocked out. He also reports that some good showings of uranium minerals have been found in the district.

The West Uranium and Development Corporation is drilling for uranium on several thousands of acres it has leased in San Miguel County, New Mexico. The firm also has holdings in Mora and Santa Fe counties. Headquarters are in Hobbs, New Mexico. Principal officials are R. V. West, M. V. West, and Don P. Pevehouse.

The old San Miguel mine in Sandoval County near Cuba, New Mexico has been reactivated by Great Eastern Mines Inc., and silicious copper ore is being shipped to the smelter at El Paso, Texas.

Spencer Uranium Company has acquired all of the properties and assets of Bee Sho Shee Company at Farmington, San Juan County, New Mexico. Spencer's Yazzie mine in Arizona is just across the San Juan County line. Bee Sho Shee had 160 acres in Indian permits near Vanadium Corporation of

America's Monument No. 2 mines and 40 acres adjacent to Spencer's claims.

Swan-Finch Oil Corporation has acquired 85 leases on uranium oil-bearing properties in northwestern New Mexico through an arrangement in which Swan-Finch acquired all of the stock of Colamer Corporation which owned the leases. The properties are in the Poison Canyon area of Valencia and McKinley counties near Grants.

Onego Corporation has shipped more than 100,000 pounds of mica from the Old Priest mine near Ribera, New Mexico. Processing tests at Fort Worth, Texas will determine the type of processing plant to be installed at the mine. The Old Priest mine recovers mica as a by-product; primary operations are for recovery of beryl and columbium-tantalum. The Onego Corporation has western division headquarters at Santa Fe.



The TL shaft of Eureka Corporation Ltd. near Eureka, Nevada has reached a depth of 1,125 feet and a station is being cut at the 1,050 level. A crosscut will be driven from the 850-foot level to encounter an ore body of an indicated width of 15 feet, intersected by drill hole 106 about 150 feet north of the shaft.

The ore in the drill hole was plumbogjarosite. Progress in the shaft has been slow over the last few months because of water coming from the Hamburg dolomite.

Gabbs Exploration Company is reported to have purchased the property of Mina Development Company in Mineral County, Nevada, including the Lost Steers mercury mine. Gabbs Exploration operates a tungsten mine and mill in the Gabbs district of Nye County. The firm plans an extensive exploration and development program at the mercury property.

Bruhi Mining Company started its new mill on its initial 30-day trial run at Silver Peak, Nevada. The mine is at Argente, and Curtis Cline has the haulage contract between mine and mill. Church Holmes is general manager of Bruhi; E. J. Shirley is mine superintendent, and Ed King is mill superintendent. Avery Brundage controls the company.

Tungsten Mountain Mining Company has taken about \$82,000 worth of tungsten oxide from an exploration tunnel driven at its property near Fallon, Nevada. At last report, it was preparing to diamond drill the ore deposit under a \$35,000 DMEA project. Arthur Lakes, mining engineer of Spokane and Nelson, British Columbia, is in charge of the property. He is also one of the owners.

Mill changes for J. R. Simplot Company's Nevada silica operations at Overton are on the drafting board. These changes anticipate the installation of a drier and possible flow sheet for silica flour.

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NEW JERSEY

Western Phosphates Plant To Undergo Big Expansion

Western Phosphates, Inc. has announced a \$2,000,000 expansion program at its Garfield, Utah reduction plant. The present plant is already operating at 120 percent of rated capacity, and expanded facilities are needed for a heavily increased demand for fertilizers in the western area of the United States. The projected expansion will include a 40 percent increase in overall production of ammoniated phosphate and treble superphosphates.

Present input of phosphate rock at the operation is approximately 92,000 tons annually. This will be boosted to 135,000 tons. Annual production of phosphate fertilizers from the plant is expected to reach from 150,000 to 175,000 tons after the project is completed late in 1956. Principal feature of the new program is believed to be the availability of anhydrous ammonia next year from the ammonia plant of the Geneva Works, Columbia-Geneva Steel Division, United States Steel Corporation. Western Phosphates is expected to enter upon a program of high strength ammonia and phosphatic fertilizer production.

Elwood I. Lentz was recently named vice president and general manager of the firm, succeeding John Paul Jones. Mr. Lentz had previously served as plant manager. Western Phosphates is a joint affiliate of Stauffer Chemical Company, American Smelting & Refining Company, and Kennecott Copper Corporation.

Trace Elements To Build Colorado Uranium Plant

Trace Elements Corporation of Grand Junction, Colorado has signed a contract with the United States Atomic Energy Commission to construct and operate a uranium ore-processing plant at Maybell, Moffat County, Colorado.

The plant, which will be owned by Trace Elements, will process ores from northwestern Colorado. Full-scale operation is expected by early 1957, and prior to that time the firm will carry out pilot plant tests to develop design criteria.

COLORADO

Hidden Splendor Mining Company, Grand Junction, Colorado, Atlas Corporation subsidiary, has obtained an option to buy, for cash, all the outstanding stock of Almar Minerals, Inc. Almar owns 51 percent interest in the Daniel Ruddock orebody located in Utah's Big Indian mining district and holds approximately 700 mining claims throughout the Colorado Plateau. The option was acquired from the Ruddock interests, owners of Almar, by assignment of the option which Mountain Mesa Uranium Corporation, Wyoming, had on the stock. Mountain Mesa has made arrangements to acquire all of the outstanding capital stock of Cal-Uranium Corporation, also, controlled by the Ruddocks and one of the oldest mines in the district.

Weekly uranium production at the Lark Leighton mine in Bull Canyon, Montrose County, Colorado, is now 50 tons. The mine was recently purchased by North Standard Mining Company from Clyde R. Bellows and associates. Clyde Uranium Mines had operated the mine since last February and in that period shipped 632 tons of ore which brought more than \$28,000. North Standard paid \$65,000 in stock and cash for the property. Mr. Bellows has been retained as mine manager.

Exploration work is now underway at Los Ochos mining property of the Gunnison Mining Company of Vance and Garth Thornburg, John and Clint Murchison, and Sid Richardson. Shipments to Climax Uranium Company and Vitro Uranium Corporation have been going on since last December, and the firm hopes to block out enough ore to justify construction of a mill.

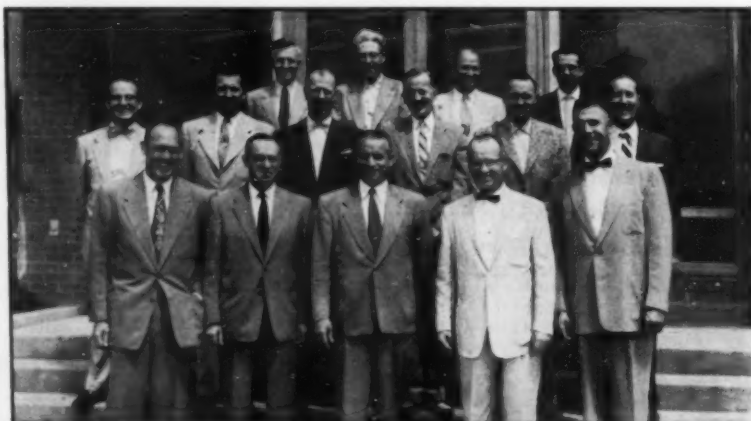
The U. S. Bureau of Mines is conducting recovery operations at its Rifle, Colorado experimental station in an effort to recover \$300,000 in mining equipment which was buried in a cave-in at the mine last February. Costs are expected to be negligible, since Climax Molybdenum Company has reportedly loaned machinery for the work. The Bureau has also reported plans to drive two new tunnels at the mine during the current fiscal year. Congress recently approved a \$1,000,000 appropriation to find new feasible methods of mining oil shale at the experimental mine and to put the station's retorting and refining plants in stand-by condition.

Consolidated Ranwick Uranium Mines, Canadian uranium firm, has acquired holdings near Dove Creek, Colorado, and Blanding, Utah. Drilling and underground development work are in progress at both properties. The company also has uranium prospects near Canon City, Colorado, Karnes City, Texas, and Moab, Utah. Stockholders have been asked to approve change in the corporate name to International Ranwick Ltd.

Companies recently filing with the Securities Exchange Commission in Colorado include: Three Forks Oil and Uranium Company, Denver; Defender Mining Company, Silver Cliff; 90 Oil and Uranium Company, Longmont; Sierra Verde Minerals, Inc., Grand Junction; National Mines Minerals, Inc., Denver; Mountain Standard Uranium Corporation, Denver; Sierra Verde Minerals, Inc., Grand Junction; Atom-Ore Uranium Company, Pueblo; Tedco Uranium, Inc., Wheat Ridge; Associated Uranium & Oil, Inc., Grand Junction; Seven Devils Corporation, Englewood; Mia Nina Mining Corporation, Denver; Tech-Ser Mining Company, Grand Junction; Death Valley Mining & Milling Corporation, Denver; Jack of Diamonds Mining Corporation, Denver; Pinyon Oil & Uranium Company, Durango; Denver-Golden Oil & Uranium Company, Denver.

Sidney Mining Company and Mascot Mines, Inc., Kellogg, Idaho, expect to resume drilling of the Alto claims in Colorado's Gateway uranium district.

United Uranium Corporation, Denver, Colorado, has been shipping ore from its Dolores Canyon claims 19 miles southeast



Chairman Named for Rocky Mountain Conference

Shown above are committee chairmen of the Second Annual Rocky Mountain Minerals Conference and Fall Minerals Beneficiation Meeting, sponsored by the American Institute of Mining and Metallurgical Engineers. The meeting is being held in Salt Lake City, Utah, October 6, 7, and 8. Chairmen are (left to right): Front row: GLEN A. BURT, secretary, Utah section; NORMAN WEISS, co-chairman of the conference; NEIL PLUMMER, vice-chairman, Utah section; J. M. EHRHORN, chairman, Utah section; R. C. COLE, co-chairman, of the conference. Second row: C. P. MOTT, chairman, meeting rooms and equipment committee; RAYMOND THOMPSON, chairman, extractive metallurgy, non-ferrous; I. K. HEARN, chairman, cocktail buffet committee; S. I. BOWDITCH, chairman, mining and geology committee; V. L. STEVENS, publicity chairman; W. F. RAPPOLD, chairman, industrial minerals. Third row: I. G. PICKERING, chairman, hotel reservations; R. E. O'BRIEN, field secretary, AIME; K. A. LEHNER, chairman, entertainment committee; E. K. OLSON, chairman, field trips. Absent when the picture was taken were GRANT SCHAUNBURG, co-chairman, field trips; EWALD KIPP, co-chairman, cocktail buffet committee; R. W. LAWSON, luncheon chairman; MAX DUBOIS, co-chairman, entertainment committee; LEONARD TOFFT, chairman, ferrous metallurgy.

of Dove Creek, Colorado. The firm has 25 unpatented claims totaling 500 acres. Approximately 345 of these acres are in the Shinarump formation. President of United Uranium is Ray Fahlender of Denver.

A branch office in Grand Junction, Colorado was opened in June by the Colorado Mining Association. With offices in the Chamber of Commerce Building, the branch will be manned by Dean Hanson, former manager of the Cortez, Colorado Chamber of Commerce. The new office is designed to serve the needs of miners in the Four Corners area.

Geophysical exploration in the mining industry again reached a record high in 1954, according to a report from the Society of Exploration Geophysicists. The group will meet in Denver, Colorado, October 3-6 for its fifth annual convention.

Among new uranium firms filing with the Securities and Exchange Commission in Colorado are: *Horseshoe Canyon Uranium, Inc.*, Salt Lake City, Utah; *Kin'el Uranium Corporation*, Reno, Nevada; *Mojava Uranium Company*, Salt Lake City, Utah; *Equitable Uranium Corporation*, Aurora, Colorado; *Uranium Ventures Corporation*, Reno, Nevada; *Vanadium Queen Uranium Corporation*, Denver, Colorado.



The Defense Minerals Exploration Administration has approved a \$35,000 exploration loan for *Yankee Uranium Company*, Salt Lake City, Utah. The firm has uranium claims in Montrose County, Colorado.

Kingdom Uranium & Mining Company is now producing uranium ore at its *Loya Ray* mine nine miles north of Monticello, Utah. The first truckload of ore was sent to the *Vanadium Corporation of America's* mill in Durango, Colorado in June. Norbert B. Filla is vice president and superintendent of the firm, which also has uranium operations in Wyoming.

Moab Uranium Company has become the first uranium corporation with headquarters in Moab, Utah to vote a cash dividend for its shareholders. The payment approved by stockholders was 10 percent on par value, which is currently 5 cents per share. Moab Uranium owns or holds interest in more than 2,300 claims. Three companies are reportedly interested in merging with Moab Uranium.

Hidden Splendor Mining Company is now producing more than 500 tons of ore per month at its Emery County, Utah mine. This rate has been maintained since mining operations began in July.

Full-scale operations are now underway at *International Smelting & Refining Company's* Tooele, Utah reduction plant. In May the lead-zinc concentrator was reopened on a limited basis after a shutdown of nearly a year due to low market prices. Approximately 400 persons are now employed at the operation, including the concentrator, the sinter plant, lead blast furnaces, and the zinc fuming plant. The smelter and zinc fuming plants had been scheduled to reopen several months ago, but negotiations between IS&R and

the International Union of Mine, Mill, and Smelter Workers delayed reactivation of the smelter.

Construction of a pilot plant at the Salt Lake City, Utah mill of *Vitro Uranium Company*, a division of *Vitro Corporation of America*, is scheduled for the end of this month. A new process for the reduction of uranium ore will be studied at the pilot plant, and approximately \$100,000 is expected to be spent on the project. The plant will be large enough to permit plant-scale test work, and, according to R. C. Cole, plant manager, should indicate commercial possibilities of streamlining and expanding *Vitro's* Salt Lake City mill in 1956. Contractors for the pilot plant are *Western Steel Company*, *Stearns-Roger Company*, and *H. P. Foley Company*.

Paramount Uranium Corporation stockholders will meet in Moab, Utah this month to vote on a merger with *Atlas Uranium Corporation*. A proposed plan calls for outright sale of all Paramount assets to Atlas. Paramount has been shipping ore from its Montezuma Canyon mine in San Juan County, Utah since December.

Bear Creek Mining Company, domestic exploration subsidiary of *Kennecott Copper Corporation*, has begun deep drilling for nonferrous metal mineralization on the 3,000-acre Jenny Lind unit in the Eureka-Tintic district of Utah. The firm recently took over as operator of the *E. J. Longyear Company* project, which is part of a "unit" exploration program being conducted jointly by several Colorado Plateau mining companies, including *Chief Consolidated Mining Company*, in the Eureka area. During the past two months Bear Creek personnel have been conducting surface geological reconnaissance work and geo-chemical prospecting.

Nearly 20,000 acres of State of Utah uranium leases have been purchased by *Ladoric Mines, Ltd.*, New York City, from Jesse H. Knight of Calgary, Canada, and Roy L. Tallant, Salt Lake City, Utah. Leases are spread throughout San Juan, Grand, Emery, Wayne, and Garfield counties in Utah. A field office has been established by Ladoric in Deming, New Mexico, where president Laurence Hammond maintains offices as vice president and general manager of *Florida Manganese, Inc.*

Uteco Uranium, Inc. of Moab, Utah is conducting an exploration program on 132 claims in Grand and San Juan counties, Utah. Drilling has started on the

Hole-in-the-Rock claims near Paradox Basin and in Coal Bed Canyon in San Juan County. Both of these groups are adjacent to producing properties. Uteco is also drilling on its *Evening Star* claims at Indian Creek. Fives holes reportedly have good mineralization. George J. Burck is Uteco president, and Leland Davis is geologist for the firm.

Stockholders of seven uranium companies have been notified that their corporations have been officially merged into the *Midwest Consolidated Uranium Corporation*. Involved are the *Allred*, *Blue Mountain*, *Geronimo*, *Henry Mountain*, *Midwest*, *Wildcat* and *World Uranium* corporations. Composite holdings include 884 claims in San Miguel, Montrose, Fremont and Routt counties, Colorado; San Juan and Garfield counties, Utah; Fremont County, Wyoming; and Fall River County, South Dakota. President of the new corporation is Nathan R. Kobey.

Directors of *British Western America Uranium Corporation*, Denver, Colorado, and London, England, and *Pioneer Uranium Corporation*, Moab, Utah have approved merger plans. The companies will operate as *British Western America Uranium Corporation*, and exploration and development work will be directed by George C. Heikes, executive vice president. Properties of the firm include claims in Fremont County, Wyoming; Montrose County, Colorado, and in the Monticello, Utah area.

The *Dravo Corporation* has been awarded the contract for sinking of a third mine shaft at the *Westvaco* trona mine of *Intermountain Chemical Corporation*, Green River, Wyoming. The shaft will be concrete lined, 18 feet in diameter, and 1,500 feet deep and will be used for ventilation purposes at first. It may eventually be used for movement of men and materials. Shaft No. 2 will continue to serve as an exit air shaft, and shaft No. 1 will continue handling men and materials.

July receipts at the Riverton, Wyoming buying station of the *United States Atomic Energy Commission* set a new record, according to manager Charles

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ROCKY MOUNTAIN

Bruner. The month's receipts were approximately one-fifth higher than those for June, which was also a record month. Specific data concerning tonnages is classified information, but indications are that Fremont County is becoming a major uranium producing area. The buying station is operated for the AEC by the American Smelting and Refining Company.

The J. R. Simplot Company, Boise, Idaho, is doing extensive testing work this summer on a large number of iron claims in the South Pass area, 30 miles south of Lander, Wyoming. A large trailer camp has been established, and work has started on two test shafts.

The Kaweck Chemical Company, Boyertown, Pennsylvania, is making preliminary investigations of a possible selenium plant site near Shoshone, Wyoming. The United States Bureau of Mines has not finished its research on selenium deposits in the area, and Kaweck officials state that no decision on location of the plant will be made for some time.

Vitro Minerals Corporation is planning a daily shipment of 50 tons of uranium ore from its Gas Hills, Fremont County, Wyoming property in the near future. The company, a joint affiliate of Vitro Corporation of America, Salt Lake City, Utah, and Pittsburgh Rochester Coal Company, Indiana, Pennsylvania, is also continuing drilling operations on the Desert Queen-Day properties in the San Raphael area of Utah.

SOUTH DAKOTA

Edgemont Mining and Uranium Corporation, Edgemont, South Dakota, has acquired all the assets of Stader Uranium Company. The new holdings comprise 1,700 acres in 84 claims and a 160-acre lease. The property is in the same area as Edgemont's Gould mine, a major producer of the state.

General Minerals Corporation, Chicago, Illinois, has acquired a total of 495 mining claims in South Dakota, Colorado, and Utah. The firm is backed by oil interests; largest shareholder is General American Oil Company of Texas. Other principal interest holders are S. Y. Guthrie of Dallas, Texas; Rosebud Oils, Inc., of Huron, South Dakota, and directors and officers of the three firms. The South Dakota properties of the company are located in Custer, Fall River, and Harding counties.

Recently filing articles of incorporation in South Dakota were the following firms: Plateau Development Company, Martin; White River Uranium Exploration and Mining Company, Rapid City; Aberdeen-Lemon Group, Aberdeen; Black Hills Exploration Company, Deadwood; West River Exploration and Mining Company, Gregory; Mercury Uranium Mines, Inc., Edgemont; M.I.L. Uranium, Inc., Rapid City.

Daily output of uranium ore at the Lonesome Pete Claim No. 2, 14 miles north of Buffalo, South Dakota is now 12 tons. Shipments to the Edgemont AEC ore buying station have brought from \$85 to \$90 per ton. Operators are J. M. Josephson and William Haivala.

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